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Sorption of radionuclides in bentonites and rocks is one of the key processes in the safe geological disposal of radioactive waste. Japan Atomic Energy Agency (JAEA) has developed sorption database (JAEA-SDB) which includes extensive compilation of sorption K_d data by batch experiments, extracted from published literatures. JAEA published the first SDB as an important basis for the H12 performance assessment (PA), and has been continuing to improve and update the SDB in view of potential future data needs, focusing on assuring the desired quality level and practical applications to K_d-setting for the geological environment.
The JAEA-SDB includes more than 24,000 K_d data which are related with various conditions and methods, and different reliabilities. Accordingly, the quality assuring (QA) and classifying guideline/criteria has been developed in order to evaluate the reliability of each K_d value. The reliability of K_d values of key radionuclides for bentonite, mudstone, granite and Fe-oxide/hydroxide, Al-oxide/hydroxide has been already evaluated. These QA information has been made available to access through the web-based JAEA-SDB since March, 2009.
In this report, the QA/classification of selected entries in the JAEA-SDB, focusing on key radionuclides (Th, Np, Am, Se and Cs) sorption on tuff existing widely in geological environment, was done following the approach/guideline defined in our previous report. As a result, the reliability of 560 K_d values was evaluated and classified. This classification scheme is expected to make it possible to obtain quick overview of the available data from the SDB, and to have suitable access to the respective data for K_d-setting in PA.

Keywords: Sorption Database, Distribution Coefficient, K_d, Reliability, Quality Assuarance, Geological Disposal

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収着データベースに登録された収着分配係数の信頼度評価（4）

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放射性廃棄物の地層処分安全評価において，人工バリアであるベントナイトや天然バリアである岩石中での核種の収着現象は，核種の移行遅延を支配する重要な現象である。日本原子力研究開発機構（JAEA）では，バッチ法収着試験によって得られた収着分配係数を公開文献から抽出・整理して収着データベース（JAEA-SDB）として整備を進めてきた。最初の収着データベースを，地層処分研究開発第 2 次取りまとめの性能評価の重要な基盤情報として整備して以降，将来の性能評価におけるニーズへの対応を念頭に，データベースに含まれる K_d データの信頼度評価，実際の地質環境に対する K_d 設定におけるデータベース適用に着目して，データベースの改良・更新を継続的に実施してきている。

JAEA-SDB に登録されている K_d データは 24,000 データを超え, 様々な実験条件や手法によって得られた信頼度の異なるデータが含まれる。このため，個々の K_d データの信頼性を評価することを目的に, 信頼度評価とそのレベル分けに関するガイドライン/基準が開発された。これまでに，このガイドラインに基づき，ベントナイト系，泥岩系，花崗岩系および鉄やアルミニウムの酸化物/水酸化物系の主要核種の K_d データを対象に信頼度評価を実施した。これらの信頼度評価結果は, 信頼度情報に基づくデータ抽出機能等を付加した Web アプリケーションによるデータベースを通じて，2009 年 3 月以降利用可能である。

本報告書では，JAEA-SDB に含まれる重要核種(Th，Np，Am，Se，Cs)の K_d データのうち，地質環境に広く存在する凝灰岩系岩石を対象として，これまで報告してきた信頼度評価手法に従って評価を実施した。その結果として，560 の K_d データに対して，新たな信頼度情報が付与された。この信頼度評価手法は, 収着データベースから利用可能な関連データ群を速やかに抽出し，K_d データ設定の際に参照すべきデータを適切に選定する上で，有効な手法となると考えられる。

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1. Introduction

Sorption and diffusion of radionuclides in buffer materials (bentonite) and host rocks (rock matrix) are the key processes in the safe geological disposal of radioactive waste, because migration of radionuclides in these barrier materials is expected to be diffusion-controlled and retarded by sorption processes. Sorption and diffusion of radionuclides on these barrier materials depends critically on relevant geochemical conditions, especially K_d values are highly conditional parameters (e.g., NEA, 2001; 2005). It is therefore necessary to understand the detailed/coupled processes of diffusion and sorption in compacted bentonite/intact rock, and to develop the database containing extensive compilation of sorption K_d data and the mechanistic/predictive model/database, so that reliable parameters can be set under a variety of geochemical conditions relevant to performance assessment (PA).

Japan Atomic Energy Agency (JAEA) has developed the sorption databases (SDB), which were firstly developed as an important basis for the H12 performance assessment (JNC, 1999; Shibutani et al., 1999). JAEA has been and is continuing to improve and update the SDB/DDB in view of potential future data needs, focusing on;

1) updating of sorption data (Suyama and Sasamoto, 2004; Saito et al., 2007)
2) assuring the desired quality level (Ochs et al., 2007; Saito et al., 2008; Ochs et al., 2010)
3) testing and applicating of the databases to parameter-setting (Ochs et al., 2008).

To extract the respective K_d data for PA-related K_d setting using JAEA-SDB, which contains more than 24,000 K_d data as well as the corresponding experimental conditions, the quality assuring (QA) and classifying guideline/criteria has been developed (Ochs et al., 2007). Based on the guideline, the reliability of K_d values of key radionuclides for bentonite (Ochs et al., 2007), mudstone (Saito et al., 2008), and granite, Fe-oxide/hydroxide, Al-oxide/hydroxide (Ochs et al., 2009) has been already evaluated. The web-based sorption and diffusion database system (JAEA-SDB/DDB) has been developed to utilize quality assuring procedure and to allow effective application for parameter setting (Tachi et al., 2010; http://migrationdb.jaea.go.jp).

In this report, the selected K_d data in the JAEA-SDB for key radioniclides (Th, Np, Am, Se, Cs) on tuff existing widely in Japanese geological environments was classified based on the QA guideline (chapter 2; Ochs et al., 2007). Evaluated results of selected entries for tuff in the JAEA-SDB are presented for three categorized criteria in chapter 3;

Criteria I - Completeness of documentation and type of K_d information
Criteria II - Quality of reported data
Criteria III- Consistency of data

The details of the evaluation and classification for the selected entries of the SDB are listed in the appendix.

2. Reliability of JAEA-SDB: Classification Guideline

2.1 Introduction, description of main criteria

The reliability of K_d values in the JAEA-SDB can be assessed using the following three main criteria. The three main criteria are listed in the expected sequence of application during a classification of entries in the JAEA-SDB. Criteria I-a and I-b are related to documentation and data entry, whereas the technical and scientific quality of an entry is addressed by criteria II and III.

Criteria I − Completeness of documentation and type of K_d information:

a) It needs to be verified that the documentation of each entry is detailed enough to allow further examination according to the main criteria II-III. At this point, only the completeness of the documentation is examined; the appropriateness of the reported data and approaches is evaluated under criteria II below.

b) This point takes also into account that the reliability of data input to the JAEA-SDB will be substantially high if K_d values are directly available in table format in comparison to literature that reports e.g. %-adsorbed values in a graph. The latter way of reporting requires the operator to i) manually read values off a graph and ii) to calculate K_d from the %-adsorbed and Solid/water ratio (s/w) values given, which significantly increases the likelihood of an operator error during data input.

Criteria II − Quality of reported data

This is the most important issue from a technical and scientific point of view. This criteria encompasses an evaluation of the appropriateness of the experimental system to produce reliable K_d data. The methods used (or lacking) for determining experimental uncertainty are also examined for each literature source. Further, it is considered whether the data represent single-point measurements or are part of e.g. an isotherm, which would provide additional support for their reliability.

Criteria III − Consistency of data:

While the previous two main criteria address the reliability of each K_d entry in the JAEA-SDB, criteria No. III requires an examination of the level of support that other K_d values in similar systems can lend to the entry under consideration. Any disagreement with data from related systems will have to be evaluated as well. It could be argued that this kind of data examination may be left to the user of the JAEA-SDB. However, the classification of data entries in the JAEA-SDB in terms of reliability adds an aspect of quality that is above that for a pure compilation, and users may expect that the listed K_d values passed some kind of check for internal consistency.

Internal consistency means that data from different sources should not be in obvious disagreement. An example would be the dependency on pH of K_d values for a certain radionuclide, which should be approximately similar in all studies. Similarly, if many studies indicate e.g. stronger sorption of U(IV) than of Th(IV), for any study that indicates the opposite an appropriate explanation should be given. If no good reason can be found, such deviations make a study less reliable. These types of considerations will only be possible for sufficiently well researched elements.

2.2 Description of checkpoints within each main criteria

2.2.1 General

Each entry in the JAEA-SDB (each K_d value identified in the JAEA-SDB by a unique ID) should be evaluated and classified individually. Because many studies report K_d values under different experimental conditions, it is not sufficient to evaluate all data based on a given reference globally. Depending on conditions, different entries related to a given study may receive a different rating.

2.2.2 Criteria I: Completeness of documentation and type of K_d information

The checkpoints under I-a are used for a screening prior to a further classification. Failure to satisfy these checkpoints will not be used (unreliable).

I-a.1 Are all mandatory fields completed? Here it is only verified that all fields have been completed by the operator; an entry "not reported" is counted, therefore. The following entries are considered mandatory:

- element
- solid phase
- solution composition
- atmosphere
- pH (or other information that allows to derive pH, e.g. portlandite equilibrium)

- pe/redox condition (only in case of redox-sensitive systems)
- method of pe control (only in case of redox sensitive systems and imposed reducing conditions)
- initial radionuclide (RN) concentration (except for RN that are not solubility controlled)
- method for phase separation
- type of experiment, if different from batch

→ In case of missing entries, the corresponding K_d is excluded from further evaluation and classified as unreliable (until remedied by operator). If all fields are completed, proceed to I-a.2.

I-a.2 Is all mandatory information provided? Here it is evaluated whether critical information is provided or lacking completely. The quality of the information provided is evaluated under criteria II. In addition to the information listed under I-a.1, further mandatory information includes:

- units

→ In case of missing mandatory information, the corresponding K_d is excluded from further evaluation and classified as unreliable. If all fields are completed, proceed to I-b.

I-b Does the type of K_d information provided require manipulation by the operator?

→ The following levels are distinguished:

class 1:	table with K_d values given
class 2:	table with % sorbed given table with residual concentration given
class 3:	linear graph K_d
class 4:	linear graph % sorbed linear graph residual concentration
class 5:	logarithmic graph K_d
class 6:	logarithmic graph % sorbed logarithmic graph residual concentration

2.2.3 Criteria II: Technical and scientific quality of reported data

It is generally assumed that the entries presently contained in the JAEA-SDB correspond to a minimum quality standard; i.e. are assumed to be basically reliable. The different checkpoints regarding experimental quality are designed to distinguish different levels of reliability. However, if in case of critical checkpoints even the requirements leading to the lowest rating are not met, the respective entry should be classified as unreliable (indicated for each checkpoint).

II-a Solid phase (substrate)

It is evaluated whether the solid phase has been sufficiently characterized. This is equally important for properly designing experiments, as well as for using the measured K_d values. In general, three types of key information are required:

- Information about major mineral composition.
- Information about accessory minerals or impurities.
- Information about surface characteristics: Minimum is a measure of sorption capacity per mass of sorbent, such as CEC or a different measure of site density per mass.

However, the amount of information required to sufficiently characterize a given solid phase also depends on the complexity of the substrate:

1. It needs to be known whether a substrate consists of a single pure mineral phase, or whether it contains impurities or additional minerals. In general, some measure of site density per mass (e.g. CEC) needs to be known to properly design experiments, in particular with respect to achieving reasonable surface loading.
2. In case of simple substrates (pure minerals), no further information is necessary.
3. In case of complex substrates (i.e., where significant impurities are present, or where a substrate is composed of several minerals), and in particular in case of natural samples, detailed information on composition has to be provided in addition.
4. In cases where sample treatment (such as crushing or sieving) had been performed, the respective information on particle size also needs to be provided (see II-f). Where any chemical treatments (e.g. acid washing to remove calcite; but also change of redox conditions in case of redox-sensitive substrates, see II-c) had been applied, the applied method and resulting mineralogy should be given as well.

5. In case of many commercially available substrates (e.g., MX-80 or Kunigel-V1 bentonite; standard clay minerals from the Clay Minerals Society, such as SWy-1; Min-U-Sil SiO_2, etc.) detailed solid phase information is widely known and can be retrieved from a large number of publications. Therefore, characterization of such solids is not required for each entry in the JAEA-SDB; i.e., level A or B can be reached even if such information is not reported. Note that this holds only when such solids have been used as received. Where washing procedures etc. have been applied, the procedures and resulting changes still need to be documented.

→ Three levels of reliability:

A) Major and minor mineralogy as well as surface characteristics are known.

For example: The substrate is a single, well-defined mineral; or comprehensively characterized complex mineral assemblage. Either no sample treatment has been carried out, or it is described in detail and the result are documented.

B) Major mineralogy as well as surface characteristics are known.

For example: The substrate is a single mineral that may contain impurities (such as a non-purified clay mineral) or a complex mineral assemblage where additional impurities could be present. Sample treatment may have led to minor changes in mineralogy.

C/D) Information on both major mineralogy or surface characteristics is lacking.

For example: There is no information on CEC (or another measure of sorption capacity); or the substrate is a natural clay sample where it is not clear whether it is smectite, kaolinite, or illite; or a non-characterized soil or crushed rock. Sample treatment may have led to major changes in mineralogy that are not documented.

II-b Adjustment and control of pH

One of the most important solution parameters controlling radionuclide(RN) sorption is pH. It needs to be known to interpret K_d values, but also for proper experimentation: The pH needs to be known to evaluate the solubility limits of radionuclides and some major ions, as well as the stability of certain mineral phases (in particular carbonates). Further, pH has to be approximately constant during a sorption experiment in order to reach equilibrium of sorption reactions. There are two basically different approaches in sorption experiments with regard to pH control:

1. The pH is not controlled, but allowed to reach an equilibrium value according to the experimental conditions and is then measured at the end of the experiment. In this case, it is important that the pH has been verified after experimentation, in order to know its equilibrium value.
2. The pH is controlled during the experiment by acid-base addition and/or buffers. Where it is desired to determine K_d values as a function of pH, this cannot be avoided. In this case, it needs to be shown (or known from the literature) that the added acids, bases, or buffers do not interfere with RN reactions at the surface (which obviously influence sorption) or with RN reactions in solution (which influence sorption through changing the RN speciation). Therefore, use of a non-inert pH buffer at unspecified concentration levels leads to a classification as unreliable.

→ Four levels of reliability:

A) To achieve rating A it is sufficient, but required, that the pH is verified at the end of the experiment. This is based on the assumption that equilibrium or at least a stable state of near-equilibrium conditions has been achieved (see also II-a, II-d, and II-j). In such systems, a determination of the experimental end pH will represent an adequate measure of the actual equilibrium pH. Second, rating A is given where the successful use of inert buffers has been demonstrated (e.g. by measuring K_d in the presence and absence of buffers at some pH, or by showing through speciation calculations that the buffer does not influence RN behavior). In some cases, level A may also apply if a non-inert buffer is part of the experimental setup (see the example of K_d determination as a function of carbonate concentration under point C).

B) The final pH is reported, but only a pH range (within 1 pH unit) is given instead of a discrete pH value (the same assumptions regarding equilibrium can be made as for level A above). Rating B also applies in cases where only the initial pH is provided, but the experimental system is well buffered (for example, because a inert buffer is used, or because of the presence of a natural buffer system, such as carbonate).

C) Only the initial pH is provided, no attempt is made to control final pH. All cases where non-inert pH-buffers are being added. Note that this refers to the addition of an additional complexing ligand, such as acetate, for the control of pH. On the other hand, if a sorption experiment is carried out where K_d is measured as a function of carbonate concentration and this is simultaneously used to control pH, level A applies (given that the effect of carbonate on K_d is documented).

D) Only a range (within 1 pH unit) of initial pH is provided, no information on final pH is given.

→ If a lower quality than required for level D is evident, the respective entry is excluded from further evaluation as unreliable. If a non-inert buffer (e.g. acetate or carbonate) is used at unspecified concentration levels, the respective entry is excluded from further evaluation as unreliable.

II-c Redox conditions

Here it needs to be differentiated between systems that are not redox-sensitive and systems that are. Within the redox-sensitive systems, it needs to be further taken into account whether only the sorbing RN is redox-sensitive or whether other components of the system (such as solid phase or groundwater components) are redox-sensitive as well.

In this sense, checkpoint II-c deals with the redox control of the sorbing RN, not with redox control of an overall redox-sensitive system. If the experimental system comprises a range of redox-sensitive dissolved (e.g. organics) and solid (e.g. Fe- and Mn-phases) components, imposing redox conditions different from the original level may influence many redox-equilibria simultaneously. In such a case it can be very difficult to ascertain equilibrium or to know which solid phases are present. Such effects on solution and solid phase chemistry are addressed by checkpoints II-a and II-d. It also needs to be pointed out in this context that "imposed redox condition" does not necessarily refer only to imposing reducing conditions by adding a reducing agent, it also includes imposing oxidizing conditions by e.g. transferring a reduced natural sediment to the laboratory and exposing it to O_2 (as a matter of fact, the latter may be the more common problem).

Given the focus of this checkpoint on redox control of sorbing radionuclides explained above, two different requirements on data quality can be distinguished. Levels of reliability reflect the degree to which these two requirements are met:

1. Reliability regarding control and confirmation of the redox status of the sorbing RN.
2. Reliability regarding the absence of unwanted side effects, such as changes in RN speciation induced by the addition of a reducing agent.

→ Two levels of reliability:

A/B) Level A/B applies to entries in the JAEA-SDB where it is demonstrated that both of the above requirements are met: This includes the following cases:

- Systems which are not redox-sensitive in terms of sorption and where no reducing agents needed to be added (i.e., where the sorbing RN can take on only one oxidation state in aqueous solutions).
- Redox-sensitive systems that have been pre-equilibrated with and are being kept at ambient conditions.
- Experiments where reducing conditions are imposed on redox-sensitive RN (in otherwise stable systems) and where similar results are obtained using several reducing agents.

C/D) Level C/D applies to entries in the JAEA-SDB where meeting the above requirements may not have been demonstrated, but can be assumed with high certainty. This includes the following cases:

- Reducing conditions imposed on redox-sensitive RN (in otherwise stable systems) using one reducing agent that can be estimated (e.g. from experience or from the literature) to be effective and to be sufficiently inert with respect to influencing RN behavior.
- In cases where complexing reducing agents have been used, level C/D still can be achieved if the influence of the reducing agent on RN speciation has been estimated.
- All cases where redox conditions may be less well defined than for level A/B, but where it can be assumed that no significant artifacts regarding RN behavior are introduced and where the oxidation state of RN has been measured independently (in some cases, this may include low-O_2 conditions with a subsequent confirmation of RN oxidation state). Evaluating the reliability of such measurements is likely to require an expert decision by the operator.

→ If a lower quality than required for level C/D is evident, the respective entry is excluded from further evaluation as unreliable. For example, cases where it has been attempted to achieve reducing conditions only by minimizing the level of O_2 (e.g., by performing experiments in a N_2

atmosphere) generally should be labeled "unreliable" (except where the oxidation state of a RN somehow has been confirmed, see description of level C/D). Also, if a strongly complexing reducing agent (such as many organic acids) is used at unspecified concentration levels, the respective entry is excluded from further evaluation as unreliable.

II-d Final solution composition

Note that solution composition includes dissolved carbonate concentration, which may be controlled through, or expressed as pCO_2. Added pH-buffers or reducing agents are also included, and are addressed in checkpoints II-b and II-c.

→ Two levels of reliability:

A/B) The final solution composition is known (either from direct measurements or from the initial experimental setup and speciation calculations) and corresponds to equilibrium or is otherwise well constrained. All major components are included in the analysis. Relevant minor components (e.g. traces of carbonate or of other complexing ligands) may only be estimated. Some minor components may be unknown. In case of natural water samples, solutions are (or can be) shown to be charge balanced (within 5 %). The information on final solution composition can be obtained from i) analyses of the actual sorption samples or from ii) using pre-equilibrated solutions that had been analyzed prior to the actual sorption experiments.

C/D) The critical major solution components are known, or can be estimated approximately. There may be unknown minor components and/or less critical major components. In case of natural water samples, solutions are approximately charge balanced (within 10 %).

→ If a lower quality than required for level C/D is evident, the respective entry is excluded from further evaluation as unreliable.

II-e Temperature

Here, it is evaluated whether temperature is specified and kept constant.

→ Two levels of reliability:

A/B) Temperature is approximately specified (e.g. room temperature) and constant, or varied in a controlled fashion.

C/D) Temperature is not specified at all (i.e., it is not clear whether the experiments had been performed at room temperature or not).

II-f Liquid/Solid ratio (L/S) and grain size

It is evaluated whether enough solid had been added to avoid a significant influence by the vessel walls (see II-m), and to ensure sample reproducibility and representativeness in case of complex substrates, especially in case of large grain sizes: It is estimated that in cases where less than ca. 100 mg of solid (this value depends on grain size) has been added to each experimental vessel, sample reproducibility and representativeness becomes difficult to achieve in case of complex or crushed samples.

→ Two levels of reliability:

A/B) Enough solid had been added to each vessel to assume that

   a) [surface area sorbent] » [surface area vessel], i.e. that at least 5 m^2 of sorbent surface had been added to each vessel, and to assume that

   b) samples are reproducible and representative.

   What is enough substrate clearly depends on specific surface area and homogeneity. Fulfilling the above two requirements is typically not a problem in case of relatively homogeneous sorbents with a high specific surface are (such as clay minerals or bentonite), where "enough" may mean at least ca. 100 mg. On the other hand, "enough" may mean at least one to several grams in case of rocks (depending on specific surface area, grain size and complexity of the sample).

C/D) Any other than the above.

II-g Sorption value

It is evaluated whether an appropriate experimental design had been employed to avoid sorption values near 0% or 100%, which can lead to higher experimental uncertainty. This problem can be addressed by choosing an appropriate L/S ratio (see II-f) or/and an appropriate initial concentration of RN ([RN]) (see II-h). However, the choice of [RN] is more restricted by solubility and analytical detection limits.

A) The sorption value is in the range of 5% - 95% sorbed.

B) The sorption value is inside the range of 2% - 98% sorbed.

C/D) Any other than the above.

II-h Initial RN concentration ([RN])

This parameter is used to evaluate the likelihood of a possible supersaturation of RN-phases:

→ Three levels of reliability:

A) RN is not solubility limited, or initial [RN] was clearly (at least a factor of 5) below the solubility limit. Note that factor 5 does not take into account uncertainties in RN solubility; i.e., if the solubility of a given RN cannot be estimated with more certainty than e.g. 10^{-6} to 10^{-8} M, then initial [RN] has to be $\leq 2 \times 10^{-9}$ M for rating A to apply.

B) Initial [RN] was clearly below the solubility limit, but maybe less than a factor of 5 (see above).

C/D) [RN] was very small, and in all likelihood below their maximum solubility, but the solubility limit cannot be established clearly due to missing information (solution composition) or lacking thermodynamic data.

→ Note that the solubility limit can be defined on either thermodynamic calculations or on experimental data obtained under the relevant conditions.

→ If initial RN concentration had been clearly above the respective solubility limit, the respective entry is excluded from further evaluation as unreliable.

II-i Phase separation

Here, the appropriateness of phase separation is evaluated: Note that in cases where colloids or other artifacts are important, different phase separation methods will not lead to the same results. Identical or very similar results with different efficient methods are probably the best direct proof of absence of important colloid effects; hence such studies are rated A. Rating B would be given for methods that can be presumed to remove colloids, but where no direct proof as in A is given.

→ Three levels of reliability:

A) Identical (very similar) results are obtained with different methods of phase separation, where at least one method needs to be efficient in terms of colloids removal (ultrafiltration or high-speed centrifugation).

Accordingly, the best comparison would be between two efficient methods, such as ultrafiltration and high-speed centrifugation.

Note that such a comparison of phase separation methods is not required for each individual K_d value: For example: If the absence of artifacts has been demonstrated for some representative samples of a study by comparing an efficient and a standard method of phase separation, the rating A may be given to all datapoints of this study, even if they correspond to the standard method only.

B) Only one, but efficient method (high-speed centrifugation, ultrafiltration) is used, and there is no evidence for artifacts such as colloid effects or significant sorption to the filter.

C/D) Only one general method (normal centrifugation, membrane filtration with nominal pore sizes of 0.01～0.45 μm) is used, and there is no evidence for artifacts such as colloid effects or significant sorption to the filter.

→ If no phase separation is used, or in case of obvious evidence for artifacts (colloid effect, adsorption on filter) the respective entry is excluded from further evaluation as unreliable.

II-j Reaction time

→ Two levels of reliability:

A/B) Identical (similar) results are obtained with different reaction times, or some other demonstration of near-equilibrium is provided (e.g. separate kinetic experiments).

C/D) Only one, but reasonably long reaction time is used. What is “reasonably long” is highly dependent on the experimental system: In general, the time needed to reach equilibrium will increase with the complexity of the sorbing substrate and the strength of sorption. Sorption of Sr onto a pure clay mineral through ion exchange can be assumed to be complete within a day; sorption of a trivalent actinide onto a complex substrate may need several days to weeks for completion. In the absence of kinetic information, operator expert decisions will be required to assess this point. If possible, reaction times reported for similar systems included in the JAEA-SDB could be used to evaluate what is reasonably long. Further, even for the most simple systems a reaction time of 1 day is considered as minimum requirement.

→ If the requirement for level C/D is not met (i.e., if the reaction time cannot be assumed to be reasonably long), the respective entry is excluded from further evaluation as unreliable.

II-k Agitation method

→ Two levels of reliability:

A/B) Appropriate agitation is required in all cases, except where enough kinetic information is provided to show that equilibrium has been reached. Shaking is the preferred method, as use of stir bars can lead to abrasion of samples. In case of simple and well crystallized substrates (such as Al-oxide) or of substrates with very small grain size that are easily suspended, stir bars can also be accepted.

C/D) Any other than the above.

II-l RN loading

Ideal are values as a function of RN loading (i.e., K_d values that form part of an isotherm), otherwise low loading is preferred. RN loading (e.g. in moles RN/kg substrate) refers to the amount of RN adsorbed in relation to the amount of different surface sites available. It is known from classical isotherms (e.g. Langmuir) that a linear sorption can only be assumed if sufficient unoccupied sites are present. In case of simple substrates (including some bentonites), the linear portion of an isotherm extends to fairly high RN loading. There are other cases where K_d depends significantly on RN loading over many orders of RN concentration.

→ Three levels of reliability:

A) At least one isotherm has been determined (for a constant solution composition and L/S), and at least some experiments have been carried out using trace level RN concentration (i.e., at least some data are included within a linear sorption region).

B) No isotherm is available, but at least a limited variation of initial [RN] or L/S has been carried out, and some experiments have been carried out using trace level RN concentration (i.e., some data are included within a linear sorption region).

C/D) No variation as in A or B has been carried out.

II-m Reaction vessels

High-density polyethylene (HDPE) or Teflon are preferred over normal PE, which is preferred over glass, which may lead to sorption of radionuclides by the vessel walls. Especially at high or very low pH, glass dissolution and release of dissolved or colloidal silica may also occur. On the other hand, glass is more gas-tight (especially than PE); if that is of experimental relevance. Corrections for sorption on vessel walls should not be necessary if blank tests show that it can be neglected.

Correction for sorption on vessel walls may be needed to estimate K_d values correctly in some cases, but only in cases where a) sorption on the vessel is much stronger than on the solid sorbent, or b) if the vessel offers a significant surface area in comparison to the sorbent (see II-f). If that is not the case, the sorption on the added solid will be much greater than on the vessel in a system where both solid and vessel are present. It is further an erroneous assumption that sorption on the vessel will be same in i) the absence of the solid (no competition for RN by solid) as ii) in the presence of the solid (strong competition for RN by solid). The sorption on the walls is typically much smaller in ii) than in i). Therefore, the overall mistake is often bigger if sorption on the vessel wall is accounted for than if it is neglected.

If effects of vessel walls are corrected for, it has to be done by extracting any RN sorbed to vessel walls after experimentation (e.g. by acid washing) and establishing a complete mass balance.

→ Three levels of reliability:

A) An appropriate vessel has been used (taking into account sorption as well as tightness with respect to CO_2 or O_2, where required), and corrections for sorption on vessel wall have been performed or no sorption on vessel wall has been observed by blank tests. If effects of vessel walls are corrected for, it has to be done by extracting any RN sorbed to vessel walls after experimentation (e.g. by acid washing) and establishing a complete mass balance. If the sorption on vessel wall has been determined as significantly lower (at least two orders of magnitude in terms of K_d) than the actual K_d value and thus corrections for sorption on vessel wall have not been performed, such a case would also correspond to level A

B) An appropriate vessel has been used, and corrections for sorption on vessel walls have not been performed.

C/D) The vessel used may have been not appropriate (this is often the case with glass, see above), or corrections for sorption on vessel wall have been performed based on a blank test only (i.e., without verifying that sorption on vessel walls is relevant in the presence of a solid added, thus possibly leading to overcorrection).

II-n Uncertainty estimates

In general, uncertainties based on repeated experiments (i.e., actual observations of K_d) are preferred over uncertainties based on error propagation, as the latter is an estimate based on a type of extrapolation. Thus, the difference between levels of reliability is mainly based on the amount of actual information gained by repetitions: For level A, the entire experiment is repeated; for level B, only sampling and analysis are repeated; for C, no repetitions are carried out.

Values that are based on repetitive experiments are preferred over single experimental data points. Note, however, that this checkpoint refers to single-point K_d values and may be overruled by data being part of e.g. pH-edge, isotherm, kinetic experiment, etc., which may provide independent evidence of good reproducibility or systematic errors (see checkpoint II-o).

→ Four levels of reliability:

A) Uncertainties in K_d are derived based on entire, replicated sorption experiments (i.e., at least duplicate experiments).

B) Uncertainties in K_d are derived based on single sorption experiments that are sampled and analyzed repeatedly. This may be supplemented by error propagation.

C) Uncertainties in K_d are based on error propagation of estimated analytical and/or procedural uncertainties.

D) No error estimate is given, no repeated sampling is done.

II-o Parameter variation

Studies with a systematic variation of key parameters are much more valuable and reliable than single K_d measurements. In this context, key parameters are those that influence sorption (for example, chemical parameters such as RN concentration, pH, pCO_2, but also temperature, L/S, or grain size in case of crushed substrates), but not parameters that only help to determine the experimental framework (such as vessel type or reaction time). In particular, variation of key parameters allows improved detection of experimental problems and systematic errors. Especially the latter are not detected by repeating experiments under identical conditions. In the application of this checkpoint, care has to be taken to take into account the characteristics of the particular system studied. For example, more parameter variation may be required to show clear trends in a complicated system in comparison to a simpler one. On the other hand, the pH and carbonate concentration in experiments with calcite are quite constrained by the solid itself, and only limited variations are possible.

→ Four levels of reliability:

A) Both RN surface loading (isotherm) as well as a chemical parameter, such as pH or pCO_2 (edge), or e.g. [Na] in case of ion exchange, are varied systematically.

B) Either RN concentration (isotherm) and/or chemical parameters, such as pH or pCO_2 (edge), or e.g. [Na] in case of ion exchange (i.e., at least two parameters in total), are varied. These variations are less systematic than in A, but still allow to observe trends.

C) As B, but only one parameter in total is varied.

D) No parameter variation is done.

2.2.4 Criteria III: Consistency of data

Here it will be evaluated whether data from a particular study can be supported by other studies. Comparisons should only be made with studies that are at least as (or more) reliable than the study under investigation, based on criteria I and II. In many cases, only approximate consistencies or inconsistencies may be apparent, because of different conditions used in the different studies.

→ Therefore, the evaluation of criteria III will only be reported in the form of a comment. Any such comments will be included both in a classification report as well as in the corresponding rating summary sheets.

→ If the K_d values under investigation are clearly inconsistent with the majority of related reliable studies, and if the reason for this observation cannot be explained, they may also be labeled unreliable based on criteria III. As this requires an expert decision by the operator, the underlying reasoning needs to be clearly documented.

2.3 Overall classification

The above criteria are applied to an overall classification system as follows:

- The three criteria I-III are evaluated separately, the respective results are reported separately as well.
- Criteria I: The checkpoints under I-a are used in a yes/no screening fashion, entries not fulfilling I-a are labeled as unreliable and are not evaluated further.
- Criteria I-b is then used to assign classes 1-6 for documentation.
- Criteria II: a) The datasets that pass Criteria I are again classified according to a 6-level system, where classes 1-6 represent the highest and lowest levels of reliability. To ensure a minimum quality level, certain checkpoints are regarded as critical (marked with * in Table 2.3.1). If the quality of the data does not correspond to the respective minimum requirements, the entries are not to be used and are classified as unreliable.
  - b) To facilitate transparent averaging of all checkpoints, the following numerical system is suggested: A=3, B=2, C=1, D=0 (A/B=3 and C/D=0 in some cases).
  - c) Initially, checkpoints II-b, II-c, II-d, and II-h are evaluated (indicated in bold letters below). If an entry is rated unreliable for any of these checkpoints, it is excluded from further evaluation.
  - d) Weighting of individual checkpoints at this level is done according to the factors given in Table 2.3.1 below.
  - e) The total sum of points obtained for Criteria II is then used to indicate the level of reliability. With the present system, the maximum number of points would be 183, leading to an overall classification as follows (Table 2.3.2):

Table 2.3.1 Weighting of individual checkpoints under Criteria II.

checkpoint	description	weighting factor
II-a	solid phase (substrate)	A-C/D × 2
***II-b**	pH	A-D × 8
***II-c**	redox conditions	A/B-C/D × 8
***II-d**	final solution composition	A/B-C/D × 8
II-e	temperature	A/B-C/D × 1
II-f	L/S, grain size	A/B-C/D × 2
II-g	sorption value	A-C/D × 2
***II-h**	initial RN concentration	A-/CD × 8
*II-i	phase separation	A-C/D × 8
*II-j	reaction time	A/B-C/D × 2
II-k	agitation	A/B-C/D × 1
II-l	RN loading	A-C/D × 2
II-m	reaction vessel	A-C/D × 1
II-n	uncertainty estimates	A-D × 2
II-o	parameter variation	A-D × 8

* indicates critical checkpoints with minimum requirements;

bold letters indicate the checkpoints to be evaluated initially

Table 2.3.2 Overall classes of reliability for Criteria II

points	rating
183-151	class 1
150-121	class 2
120-91	class 3
90-61	class 4
60-31	class 5
30-0	class 6

- Criteria III: Criteria III is used to qualitatively assess consistency with other studies. In case of clear inconsistencies, an entry may be labeled as unreliable.
- Overall, the following classification system is used, with Criteria II as the main basis for assessing the reliability of entries in the JAEA-SDB.

Table 2.3.3 The classification system

Criteria	classification
I-a	accept/reject
I-b	6 classes of K_d information
II	**6 classes of data quality and reliability**
III	qualitative level of consistency with other studies

3. Classification of selected entries for tuff in the JAEA-SDB

This section presents the classification results for selected entries in the JAEA-SDB covering the datasets for the sorption of Th, Np, Am, Se and Cs on tuff.

- An overview of the results as well as the corresponding numerical rating is given in the Appendix.
- For transparency and ease of presentation, all results of Criteria I and II are presented in tabular form, using the format of the following table throughout. The results pertaining to Criteria III are discussed subsequently and are illustrated in the form of plots of K_d vs. a relevant master variable (typically pH), where applicable.
- According to the established classification guideline, criteria I and checkpoints II-b, II-c, II-d, II-h were evaluated first. Classification and final numerical rating were only completed when an entry was evaluated as reliable based on these checkpoints. Otherwise, entries were labeled "unreliable" and were excluded from further evaluation. For most reliable entries, criteria III was evaluated as well.

3.1 Criteria I and II

Data table Element/#: REF: original reference JAEA-SDB version # – DATA: element/solid sorbent, datapoint # GUIDELINE: Revision # (date)		
Checkpoint [1] "SDB"/"REF"	**Evaluation**	**Rating**
I-a.1	Are all mandatory fields completed?	Yes/No
I-a.2	Is all mandatory information provided?	Yes/No
I-b	Type of K_d information	class 1-6
II-a	Solid phase (substrate)	A-C/D
II-b	Adjustment and control of pH	A-D
II-c	Redox conditions.	A/B-C/D
II-d	Final solution composition	A/B-C/D
II-e	Temperature	A/B-C/D
II-f	Solid/water ratio (L/S) and grain size	A/B-C/D
II-g	Sorption value	A-C/D
II-h	Initial RN concentration [RN]	A-C/D
II-i	Phase separation	A-C/D
II-j	Reaction time	A/B-C/D
II-k	Agitation method	A/B-C/D
II-l	RN loading	A-C/D
II-m	Reaction vessels	A-C/D
II-n	Uncertainty estimates	A-D
II-o	Parameter variation	A-D

[1] Application of the checkpoint to the information given in the JAEA-SDB is indicated with "SDB".
"REF" indicates the additional application to the original reference indicated in each table.

3.1.1 Americium

Data table Am/1: REF: Barney (1982)
JAEA-SDB version 3.1 DATA: Am/Tuff, #44934～44953
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	REF	A table with K_d values is provided.	class 1
II-a	SDB REF	Tuff as solid phase is indicated. SSA and CEC are given. The minerals present are reported. Further composition is not reported.	B
II-b	SDB	Initial and end pH are indicated.	A
II-c	SDB REF	Indicated redox state corresponds to the information in the reference. Redox state of Am is not given in the reference. Systems were pre-equilibrated. Am in the oxidation state (III) is reported. Am is not redox sensitive.	A/B
II-d	REF	Experiments had been performed in synthetic groundwater. Final solution composition is not indicated.	C/D
II-e	SDB	It is indicated that experiments had been performed at 23℃.	A/B
II-f	SDB REF	The amount of solution/solid ratio is reported. It is indicated that surface area of tuff is 188±3 [m^2/g].	A/B
II-g	SDB	The sorption values are calculated from K_d and L/S ratios: ・# 44934～44940 ・# 44941～44951 ・#44952, #44953	 A B C/D
II-h	SDB	Initial Am concentrations from 5.75×10^{-10} to 1.83×10^{-12} M are indicated. Based on data from Rai et al. (1999), the initial Am concentration is clearly below the solution limit, but maybe less than a factor of 5.	B
II-i	SDB REF	As separation method filtration is indicated. Filtration through 30 Angstrom Amicon 50A ultrafilter is reported.	B
II-j	SDB	A contact time of 14 days is indicated.	C/D
II-k	REF	Continuous shaking (180 oscillations/min), method is not specified.	A/B
II-l	REF	Isotherms were determined at different temperatures.	A
II-m	REF	Polycarbonate centrifuge tube of 50[mL], sorption on vessel walls is not considered.	B
II-n	REF	There is no error information reported.	D
II-o	REF	Variation of solution composition (Na etc. variations).	C

Data table Am/2: REF: Baston et al. (1995b)
JAEA-SDB version 3.1 DATA: Am/Tuff, #46684～46691
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB REF	Oxidation state of Am and the contact time are not reported. It is reported that experiments were carried out in triplicate. One tube was analyzed regularly to monitor the approach to a steady state concentration of radionuclide.	Yes
I-b	SDB	A table with K_d values is given.	class 1

II-a	SDB REF	As solid phase tuff is indicated. It is noted that plagioclase and calcite are the major components of the tuff. Surface characteristics are not reported. It is reported that only plagioclase is the major component of tuff.	C/D
II-b	SDB	Initial and final pH values are indicated.	A
II-c	SDB REF	It is indicated that experiments had been conducted under nitrogen atmosphere and initial Eh values of 340[mV] are reported. Am(+III) was used for experiments and Am is not redox sensitive.	A/B
II-d	SDB	The solution composition of the synthetic groundwater and the concrete equilibrated synthetic groundwater is indicated.	A/B
II-e	SDB	The reaction temperature is not reported.	C/D
II-f	SDB	A L/S of 50[mL/g] is indicated. Although any information about the specific surface area is lacking, 1[g] of solid per reaction vial is assumed to be enough for tuff samples.	A/B
II-g	SDB	The sorption values are calculated from K_d and L/S ratios: ・# 46686 (95% sorption) ・# 46684 (96% sorption) ・# 46685, # 46687～46691 (99～100% sorption)	 A B C/D
II-h	SDB	Initial Am concentrations of 4.0×10^{-11} to 8.0×10^{-11} M are indicated. Based on speciation calculations with Phreeqci 2.14.3 using the thermodynamic data of Hummel et al. (2002) the initial Am concentration is clearly below (factor >5) the solubility limit at pH 12.4 and 7.8 for the reported solutions, respectively.	A
II-i	SDB	Centrifugation at 1,500[g] for 30 minutes combined with two different filtration proceedures was applied (0.45 μm and 30,000 MWCO). The more effective the separation procedure, the higher were the K_d values for the experiments with synthetic groundwater. These results indicate colloid formation which was not filtered off by 0.45 μm filtration. ・# 46684, #46686 ・# 46685, #46687～46691	 unreliable A
II-j	SDB REF	There is no reaction time reported. It is reported that separate kinetic measurements had been performed to monitor the approach to steady state concentration of radionuclide, what inidcates that reaction time was reasonably long. Datapoints with a timescale however are not reported.	C/D
II-k	REF	The reaction vials were continuously and gently agitated.	A/B
II-l	SDB	No variation in L/S or Am concentration had been performed.	C/D
II-m	SDB	Experiments were carried out in polypropylene centrifuge tubes. Sorption to the vessel walls was <0.5% in presence of solid phase.	A
II-n	SDB	Error estimates are indicated and are based on duplicate measurements.	A
II-o	SDB	No parameter variation had been done.	D

Data table Am/3: REF: Baston et al. (1998)
JAEA-SDB version 3.1 DATA: Am/Tuff, #65952～65957
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	SDB	A table with K_d values is provided.	class 1
II-a	SDB	As solid phase tuff is indicated. SSA is given.	C/D
II-b	SDB	The final pH is indicated.	A
II-c	SDB	Am in the oxidation state (III) is reported. Experiments were conducted under strongly reducing conditions (Na-dithionite). Am is not redox sensitive.	A/B
II-d	SDB	Experiments had been performed in de-ionized water which was equilibrated 4 weeks with the solid. Final solution composition is indicated.	A/B
II-e	SDB	It is indicated that experiments had been performed at 60℃.	A/B
II-f	SDB REF	The amount of L/S is indicated. It is not known from the reference how much solution and solid were taken respectively. Only the ratio is known.	C/D
II-g	SDB	The sorption values are calculated from K_d and L/S ratios. Sorption values of all data were 0.99～1.00%.	C/D
II-h	SDB REF	An initial Am concentration of 1.00×10^{-10} M is indicated. Solutions were filtered to ensure that no precipitates were in solution and solubility limit was not reached.	B
II-i	SDB	It is indicated that three different combinations of separation methods were employed: 1. Centrifugation 1100[g] for 15min. 2. Centrifugation followed by filtration through a 0.45 μm filter. 3. Centrifugation followed by filtration through a 0.45 μm filter followed by filtration through a 10,000 MWCO filter	B
II-j	SDB	A contact time of 122 days is indicated.	C/D
II-k	REF	As agitation method the use of a shaker/incubator was reported.	A/B
II-l	REF	No variations of initial Am concentration were done.	C/D
II-m	REF	Polypropylene centrifuge tubes, sorption on vessel walls considered, RN sorbed to vessel walls were extracted by washing with HNO_3 and afterwards measured.	A
II-n	SDB REF	Errors are indicated. Error information is based on statistics of counting only.	C
II-o	REF	No parameter variation was done.	D

Data table Am/4: REF: REF: Berry et al. (2007)
JAEA-SDB version 3.1 DATA: Am/Tuff, #46912～46917
GUIDELINE: Revision 4b (May 19, 2005)
* REMARK: Update of SDB required for I-a.2.

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB REF	Oxidation state of Am is not indicated. It is reported that the major aqueous species measured was $Am(OH)_2^+$ with oxidation state +III.	Yes
I-b	REF	A table with K_d values is given.	class 1

II-a SDB REF	As solid phase tuff is indicated. Mineral composition is reported, CEC or BET are not indicated. Surface characteristics are not reported.	C/D
II-b SDB	Final pH values are indicated.	A
II-c SDB REF	It is indicated that reducing conditions had been applied with final Eh values of −390[mV]. Am is not redox sensitive and an oxidation state (+III) is reported. Sodium dithionite ($Na_2S_2O_4$) as reducing agent was added to the reaction mixtures. The effect of sodium dithionite on Am is difficult to estimate since no experiments with another reducing agent had been done. For this reason rating C/D is applied.	C/D
II-d SDB REF	The solution composition of tuff equilibrated distilled water (equilibration at 60℃) is indicated. It is assumed that the same $Na_2S_2O_4$ concentration as in the batch experiments of Uranium was applied (2.5×10^{-3} M).	A/B
II-e SDB	A temperature of 60℃ is indicated.	A/B
II-f SDB REF	A L/S of 5[mL/g] is indicated. Although any information about the specific surface area is lacking, 1[g] of solid per reaction vial is assumed to be enough.	A/B
II-g SDB	The sorption values (calculated from K_d and L/S ratios) are all >99.8%.	C/D
II-h SDB	An initial Am concentration of 1.0×10^{-10} M is indicated. Based on speciation calculations (for 60℃) with Phreeqci 2.12.5 using the thermodynamic data in the NAGRA-PSI thermodynamic database (Hummel et al. 2002) the initial Am concentration is clearly below (factor >5) the solubility limit at the reported pH of 9.2 (due to the $AmSiO(OH)_3^{2+}$ and $Am(CO_3)_2^-$ species).	A
II-i SDB	Centrifugation only and centrifugation combined with two different filtration proceedures were applied (0.45 μm and 10,000 MWCO). The more effective the separation procedure, the higher were the K_d values. These results indicate colloid formation or sorption to the filter membranes.	unreliable

Data table Am/5: REF: Daniels et al. (1982)
JAEA-SDB version 3.1 DATA: Am/Tuff, #49383～49402
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	**Evaluation**	**Rating**
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB REF	Not all mandatory information is provided. pH, separation method, redox potential and a few initial RN concentrations are missing. The initial pH of the solutions used for experimentation and the actual pH during experimentation are not available. It is not clear whether the experimental systems had been at or near equilibrium.	No

Data table Am/6: REF: Erdal et al. (1978)
JAEA-SDB version 3.1 DATA: Am/Tuff, #50763～50768
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	**Evaluation**	**Rating**
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB	Not all mandatory information is provided. Initial RN concentration is missing.	No

Data table Am/7: REF: Erdal et al. (1979d)
JAEA-SDB version 3.1 DATA: Am/Tuff, #50917, #50922
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	**Evaluation**	**Rating**
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB	Not all mandatory information is provided. pH and initial RN concentration is missing.	No

Data table Am/8: REF: Erdal (1980)
JAEA-SDB version 3.1 DATA: Am/Tuff, #51063～51141
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	**Evaluation**	**Rating**
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB	All mandatory information is provided.	Yes
I-b REF	A table with K_d values is provided.	class 1
II-a SDB	As solid phase tuff is indicated. SSA and CEC are not given.	C/D
II-b SDB REF	pH values between 7 and 9 are given in the reference, Initial, end or both values are reported. For the data points #51075 and #51086 no pH values are given. These two points are therefore unreliable.	A unreliable
II-c SDB	Experiments were conducted under atmospheric conditions. Am in the oxidation state (III) is reported. Am is not redox sensitive.	A/B
II-d SDB	Experiments had been performed in synthetic groundwater. Final solution composition is not indicated.	C/D
II-e SDB	It is indicated that experiments had been performed at 22 and 70℃.	A/B
II-f SDB	The amount of solution/solid ratio is reported. 20/1 water-to-rock ratio, 1[g] solid with 20[mL] solution.	A/B
II-g SDB	The sorption values are calculated from K_d and L/S ratios: ・# 51063～51080, #51085～51090, #51093～51097, #51099～51102, #51119 ・# 51081～51084, #51107～51109, #51120, #51121, #51123～51125, #51127, #51129, #51130 ・Others	A B C/D
II-h SDB	An initial Am concentration of 4.00×10^{-7} M is indicated. According to the data given in Rai et al. (1999), the initial Am concentration given in the reference is above the solubility limit of americium between pH 7 and 9. UNRELIABLE. No further rating.	unreliable

Data table Am/9: REF: REF: Ikeda and Amaya (1998)
JNC-SDB version 3.1 DATA: Am/Tuff, #53543～53550
GUIDELINE: Revision 4b (May 19, 2005)
* REMARK: Update of SDB required for checkpoints II-a, II-m and II-n

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	REF	A table with K_d values is given.	class 1
II-a	SDB	As solid phase tuff is indicated. Mineral composition and surface characteristics are not reported.	B
	REF	Major mineral composition and chemical composition of tuff are indicated. A BET of 57[m^2/g] is reported.	
II-b	SDB	Initial and final pH values are indicated.	A
II-c	SDB	It is indicated that reducing conditions had been applied with final Eh values of −190[mV] to −250[mV]. Am is not redox sensitive and an oxidation state (+III) is reported.	C/D
	REF	Sodium dithionite ($Na_2S_2O_4$) as reducing agent was added to the reaction mixtures. The effect of sodium dithionite on Am is difficult to estimate since no experiments with another reducing agent had been done. For this reason rating C/D is applied.	
II-d	SDB	As water type seawater and distilled water are indicated. The solutions are 2×10^{-4} M to 1.2×10^{-3} M in sodiumdithionite, to keep reducing conditions.	
	REF	Final solution compositions are not given, but it is supposed that no essential changes take place in the case of seawater (#53543, #53548～53550).	A/B
		Major mineralogy and chemical composition of the tuff are available. Final solution composition with distilled water and the reported L/S can be estimated approximately (#53544～53547).	C/D
II-e	SDB	A temperature of 26℃ is indicated.	A/B
II-f	SDB	It is indicated that for reactions 0.1[g] of solid was added to either 49 or 50[mL] of solution. With a BET value of 57[m^2/g], rating A/B is applied.	A/B
II-g	SDB	The sorption values are calculated from K_d and L/S ratios:	
		· #53546 (sorption value 98%)	B
		· #53543～53545 and #53547～53550 (sorption >99%)	C/D
II-h	SDB	Initial Am concentrations of 1.5×10^{-10} and 1.6×10^{-10} M are reported. Based on the data in Rai et al. (1999) it is assumed that initial Am concentration was clearly below (by a factor >5) the respective solubility limit for the reported data around pH 6 to 7.4.	A
II-i	SDB	Two different filtration procedures were applied and similar results are reported: filtration with 0.45 μm membranes and with 10,000 MWCO-filters.	A
II-j	SDB	A reaction time of 26 and 33 days is indicated. No further (kinetic) information is provided.	C/D
II-k	REF	Samples were manually shaken every one to two weeks.	C/D
II-l	SDB	No variation in L/S or Am concentration had been performed.	C/D
II-m	REF	The experiments were carried out in teflon vessels. There is no information about blank measurements or sorption on vessel walls	B

	given.	
II-n SDB REF	It is indicated that replicates are not reported. Error information is available for every datapoint. Two repetitions are reported. It is unclear if the uncertainties are derived on the basis of replicated sorption experiments or are estimated analytical uncertainties.	B
II-o SDB	No parameter variation had been done.	D

Data table Am/10: REF: Meijer et al. (1990)
JAEA-SDB version 3.1 DATA: Am/Tuff, #62087～62092
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	**Evaluation**	**Rating**
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB	Not all mandatory information is provided. Water type, solution/solid, pH, contact time, separation method are missing.	No

Data table Am/11: REF: Nakayama et al. (1986)
JAEA-SDB version 3.1 DATA: Am/Tuff, #56816～56826
GUIDELINE: Revision 4b (May 19, 2005)
* REMARK: Update of SDB required for checkpoints I-a.2 and II-c.

Checkpoint	**Evaluation**	**Rating**
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB REF	It is indicated that redox state of Am and reaction temperature are not reported. Batch sorption experiments had been performed at room temperature with Am(III).	Yes
I-b REF	A table with K_d values is given.	class 1
II-a SDB REF	As solid phase Ohya tuff with different mesh sizes (32～60 and <60) and Itado tuff with a mesh size of 32～60 are indicated. Mineral composition and surface characteristics are not reported. BET values are indicated. Major mineral composition and chemical composition of the tuff samples are not reported.	C/D
II-b SDB	Final pH values are indicated.	A
II-c SDB REF	It is indicated that experiments had been performed under aerobic conditions. Eh values are not reported. Am is not redox sensitive. The oxidation state of Am is not indicated. It is reported that Am(III) was used for the experiments.	A/B
II-d SDB REF	As water type preequilibrated water and distilled water are indicated. Final solution compositions are not given. Final solution compositions are not reported. Since information about mineral composition is lacking as well, and because tuff may contain easily soluble minerals or impurities it is impossible to estimate the final solution composition.	unreliable

Data table Am/12: REF: Tanaka and Muraoka (1998)
JAEA-SDB version 3.1 DATA: Am/Tuff, #62370
GUIDELINE: Revision 4b (May 19, 2005)
* REMARK: Update of SDB required for checkpoint II-i.

Checkpoint		**Evaluation**	**Rating**
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	REF	A table with the K_d value is given.	class 1
II-a	SDB	As solid phase tuff is indicated. Chemical (elemental) composition of the tuff and CEC are reported.	C/D
	REF	Although tuff is a natural sample, no mineral assemblage is indicated.	
II-b	SDB	Initial and final pH values are indicated. The final pH covers a range within one pH unit.	B
	REF	Final pH was measured after reaching the equilibrium.	
II-c	SDB	It is indicated that experiments had been done under aerobic conditions and a final Eh value of 220 to 270[mV] is given. Am is not redox sensitive. A redox state of +III is indicated.	A/B
II-d	SDB	As water type tuff equilibrated water is indicated. A table with the final solution composition is provided.	A/B
II-e	SDB	A temperature of 25℃ is indicated.	A/B
II-f	SDB	It is indicated that 0.1[g] of solid was added to 10[mL] of solution. BET values are not reported. Since tuff typically has a high specific surface area it is assumed that 0.1[g] of solid per reaction vial is enough.	A/B
II-g	SDB	A sorption value of 99% was calculated from K_d and L/S ratio.	C/D
II-h	SDB	An initial Am concentration of 3.27×10^{-7} M is reported. Based on speciation calculations with Phreeqci 2.14.3 using the thermodynamic data in NAGRA-PSI (Hummel et al., 2002) the initial Am concentration is still a factor of >5 below the solubility limit (due to the $AmSiO(OH)_3^{2+}$ and $Am(CO_3)_2^-$ species).	A
II-i	SDB	It is indicated that filtration with 50 nm membrane was applied.	A
II-j	SDB	A reaction time of 7 days is indicated.	A/B
	REF	Sorption kinetics of distribution coefficients for Am is provided. The K_d values of the last two measurements are similar indicating near-equilibrium.	
II-k	REF	There is no information about sample agitation reported.	C/D
II-l	SDB	No variation in L/S or Am concentration had been performed.	C/D
II-m	REF	The experiments were carried out in teflon vessels. There is no information about blank measurements or sorption on vessel walls given.	B
II-n	SDB	It is indicated that only one sample measurement had been performed. There is no error information given.	D
II-o	SDB	No parameter variation had been done.	D

Data table Am/13: REF: Tanaka et al. (1998)
JAEA-SDB version 3.1 DATA: Am/Tuff, #62377, #62383, #62407～62410, #62438～62442, #62469～62473
GUIDELINE: Revision 4b (May 19, 2005)
* REMARK: Update of SDB required for checkpoints I-b and II-i and II-j.

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	SDB REF	It is indicated that K_d values are read out of a scanned figure. The diagrams are provided with logarithmic K_d values.	class 5
II-a	SDB REF	As solid phase tuff is indicated. Chemical composition of the tuff and CEC are reported. Although tuff is a natural sample, no mineral composition is indicated.	C/D
II-b	SDB REF	Initial and final pH values are indicated. For the datapoints where final pH covers a range within one pH unit rating B is applied. For datapoint #62409 the pH range is exceeding one unit, however rating B is applied assuming the same quality as the other datapoints. ・#62377, #62383, #62438～63442, #62469～62473 (exact pH values given) ・#62407, #62408, #62410 (range of one pH unit) ・#62409 (range >1 pH unit) Final pH was measured after reaching the equilibrium.	A B B
II-c	SDB	It is indicated that experiments had been done under aerobic conditions and final Eh values of 310[mV] are given. Am is not redox sensitive. A redox state of +III is indicated.	A/B
II-d	SDB	As water type tuff equilibrated solution is indicated. A table with the final solution composition is provided for each datapoint.	A/B
II-e	SDB	A temperature of 25℃ is indicated.	A/B
II-f	SDB	It is indicated that 0.1[g] of solid was added to 10[mL] of solution. BET values are not reported. Since tuff typically has a high specific surface area it is assumed that 0.1[g] of solid per reaction vial is enough.	A/B
II-g	SDB	Rating is done based on %-sorbed values calculated from the information given in the SDB: ・#62410, #62441, #62442, #62473 (97.2 to 97.6% sorbed) ・other datapoints (>98% sorbed)	B C/D
II-h	SDB	An initial Am concentration of 8.0×10^{-8} M is indicated. Based on speciation calculations with Phreeqci 2.14.3 using the thermodynamic data of Hummel et al. (2002) the initial Am concentration is at a pH up to 8.5 clearly below the solubility limit (due to the $AmSiO(OH)_3^{2+}$ and $Am(CO_3)_2^-$ species). Datapoint #62410 with an end pH of 9.5～10.0 however is according to the calculations above the solubility limit and is therefore excluded from further evaluation.	A unreliable
II-i	SDB	It is indicated that filtration with 0.45 μm membrane was applied.	C/D
II-j	SDB REF	A reaction time of 7 days is indicated. Separate kinetic measurements demonstrate near-equilibrium was reached at the given reaction time.	A/B

II-k REF	There is no information about sample agitation reported.	C/D
II-l SDB	No variation in L/S or Am concentration had been performed.	C/D
II-m REF	The experiments were carried out in teflon vessels. There is no information about blank measurements or sorption on vessel walls.	B
II-n SDB	It is indicated that only one sample measurement had been performed. There is no error information given.	D
II-o SDB	Am sorption had been measured at different pH values and at different Na and Ca concentration in solution.	B

Data table Am/14: REF: Tanaka and Muraoka(1999)
JAEA-SDB version 3.1 DATA: Am/Tuff, #61653, #61654
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	Evaluation	Rating
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB	All mandatory information are completed.	Yes
I-b SDB	A figure with log K_d values is provided.	class 5
II-a SDB	It is indicated a physico-chemical properties of the tuff samples.	A
II-b SDB	It is indicated pH of solution equilibrated with tuff samples. However pH of solution after sorption experiment is not reported.	B
II-c SDB REF	It is reported that Eh is 450[mV]. It is considered that this experiment is carried out under air condition. Am(III) is not redox sensitive.	A/B
II-d SDB REF	Initial solution composition is indicated. The final solution composition is not reported, but can be estimated based on major mineral components and initial solution composition.	A/B
II-e SDB	It is indicated that the temperature is controlled at 25℃ by using a water jacket.	A/B
II-f SDB REF	It is indicated that L/S is 10[cm^3]/0.5[g]. It is considered that quantity of solid is little.	A/B
II-g REF	The %-sorbed can be calculated with K_d and L/S ratio. This data is 5～95%.	A
II-h SDB REF	A value of 3.27×10^{-7} [M] is indicated as initial Am concentration. Based on calculations using the JAEA-TDB (100331c0.tdb), solubility of Am(III) in the given equilibrated solution is 3.49×10^{-6} [M].	A
II-i SDB	Filtration through 0.45 μm membranes is indicated.	B
II-j SDB REF	A reaction time of 7 days is indicated. No further (kinetic) information is provide.	C/D
II-k REF	It is indicated that the samples are gently agitated on a shaker at 60[rpm] for 168 hours.	A/B
II-l SDB	No variation in L/S or Am concentration had been performed.	C/D
II-m REF	No information about vessel is indicated.	C/D
II-n SDB	No information about error is indicated.	D
II-o SDB	No parameter variation had been done.	D

Data table Am/15: REF: Thomas (1987)
JAEA-SDB version 3.1 DATA: Am/Tuff, #60413～60423
GUIDELINE: Revision 4b (May 19, 2005)
* REMARK: Update of SDB required for I-a.2.

Checkpoint	Evaluation	Rating
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB	Not all mandatory information is provided: pH, Eh is missing, atmosphere conditions are indicated.	No

Data table Am/16: REF: Vine et al.(1980a)
JAEA-SDB version 3.1 DATA: Am/Tuff, #61653, #61654
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	Evaluation	Rating
I-a.1 SDB	Initial Am concentration fields are not completed.	No
I-a.2 SDB	Initial Am concentration information is not completed.	No

Data table Am/17: REF: Wolfsberg et al. (1979)
JAEA-SDB version 3.1 DATA: Tuff, Am: #61704～61709
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	Evaluation	Rating
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB REF	Not all mandatory information is provided (initial RN concentration is missing). Some information on RN concentration is provided, but it is not clear whether this refers to experiments or stock solutions.	No

Data table Am/18: REF: Wolfsberg (1981)
JAEA-SDB version 3.1 DATA: Am/Tuff, #61722～61727
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	Evaluation	Rating
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB REF	Not all mandatory information is provided, initial RN concentration is missing. For experimental details, reference to Vine et al. (1980b) is made; however, the corresponding entry in the SDB also does not contain any information on initial RN concentration.	No

3.1.2 Cesium

Data table Cs/1: REF: Ashida et al. (1999)*
JAEA-SDB version 3.1 DATA: Cs/Tuff, #62893, #62897
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	REF	The K_d values are extracted from graphs with a logarithmic scale.	class 5
II-a	SDB	Tuff is reported as mineral phase without detailed mineralogic composition. BET is provided.	C/D
II-b	SDB	Final pH values are reported (range within one pH unit).	B
II-c	SDB	It is indicated that experiments had been performed under ambient conditions (air). Cs is not redox sensitive.	A/B
II-d	SDB	As water type, 0.01 and 0.1 M NaCl-solution is indicated. Final solution compositions are not given.	C/D
II-e	SDB	A temperature of 22℃ is indicated.	A/B
II-f	SDB REF	A L/S of 100[mL/g] is indicated. Based on the given specific surface area of the tuff sample, the mass of 1[g] tuff used for an experiment has a surface area of about $24[m^2]$.	A/B
II-g	SDB	The sorption values were calculated based on the information given in the SDB. ・# 2893 (96%) ・#62897 (81%)	 B A
II-h	SDB	Initial Cs concentration is reported. Cs is not solubility limited.	A
II-i	SDB	Filtration by 10,000 MWCO-filter is indicated.	B
II-j	SDB REF	A reaction time of 30 days is indicated. The kinetics of sorption are not reported.	C/D
II-k	REF	No information is provided for the agitation method.	C/D
II-l	SDB	No isotherm, no variation of the Cs concentration and no variation of L/S are indicated.	C/D
II-m	REF	There is no information about the reaction vessels or a correction for sorption on vessel walls given.	C/D
II-n	REF	No replicates and no error estimates are reported.	D
II-o	REF	NaCl concentration is varied.	C

Data table Cs/2: REF: Barney (1982)
JAEA-SDB version 3.1 DATA: Cs/Tuff, #44989～45008
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	REF	Table with K_d values is provided.	class 1
II-a	SDB REF	A solid phase tuff are indicated. SSA and CEC are given. The minerals present are reported. Further composition is not reported.	B
II-b	SDB	Initial and end pH are indicated.	A
II-c	SDB	Indicated redox state corresponds to the information in the reference. Redox state of Cs is not given in the reference.	A/B

REF	Systems were pre-equilibrated. Cs in the oxidation state (I) is reported. Cs is not redox sensitive.	
II-d REF	Experiments had been performed in synthetic groundwater. Final solution composition is not indicated.	C/D
II-e SDB	It is indicated that experiments had been performed at 23℃.	A/B
II-f SDB REF	The amount of L/S ratio is reported. It is indicated that surface area of tuff is 188±3 [m^2/g].	A/B
II-g SDB	The sorption values were calculated based on the information given in the SDB. ・#44989～44991 ・#44992～45008	 B C/D
II-h SDB	Initial Cs concentrations from 9.54×10^{-7} to 7.94×10^{-9} M are indicated. Cs is not solubility limited.	A
II-i SDB REF	As separation method filtration is indicated. Filtration through 30 Angstrom Amicon 50A ultrafilter is reported.	B
II-j SDB	A contact time of 14 days is indicated.	C/D
II-k REF	Continuous shaking (180 oscillations/min), method not specified.	A/B
II-l REF	Isotherms were determined at different temperatures.	A
II-m REF	Polycarbonate centrifuge tube 50[mL], sorption on vessel walls not considered.	B
II-n REF	There is no error information reported.	D
II-o REF	Variation of solution composition ([Na] etc. variations).	C

Data table Cs/3: REF: Daniels et al. (1982) JAEA-SDB version 3.1 DATA: Cs/Tuff, #49551～49657 GUIDELINE: Revision 4b (May 19, 2005)		
Checkpoint	**Evaluation**	**Rating**
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB REF	Not all mandatory information is provided. pH, separation method, redox potential and a few initial RN concentrations are missing. The initial pH of the solutions used for experimentation and the actual pH during experimentation are not available. It is not clear whether the experimental systems had been at or near equilibrium.	No

Data table Cs /4: REF: Erdal et al. (1978) JNC-SDB version 3.1 DATA: Cs/Tuff, #50937～#50942 GUIDELINE: Revision 4b (May 19, 2005)		
Checkpoint	**Evaluation**	**Rating**
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB REF	Not all mandatory information is provided: pH and initial concentration are missing. No further information could be found.	No

Data table Cs/5: REF: :Maclean et al.(1978)
JAEA-SDB version 3.1 DATA: Cs/Tuff, #56189
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information are completed.	Yes
I-b	SDB	A table with K_d values is provided.	class 1
II-a	SDB	It is not indicated the composition and properties of mineral.	C/D
II-b	SDB	Only initial pH of groundwater is reported.	D
II-c	SDB REF	Redox conditions are not reported. It is considered that experiment is carried out under air condition. Cs(I) is not redox sensitive.	A/B
II-d	SDB REF	Final composition of groundwater is not reported. Initial solution composition is indicated. The final solution composition is not reported, but can be estimated based on major mineral components and initial solution composition.	C/D
II-e	SDB	A temperature of 25℃ is reported.	A/B
II-f	SDB REF	A solid/solution ratio is reported (1[g]/15[mL]). It is indicated that particle size of solid is 100～325 mesh.	A/B
II-g	REF	The %-sorbed can be calculated with K_d and L/S ratio. This data is 5～95%.	A
II-h	SDB	A value of 2.8×10^{-8} [M] is indicated as initial Cs concentration. Cs is not solubility limited.	A
II-i	SDB	It is indicated that separation method is centrifuge (3000[rpm]/20～60 minutes) and filtration (0.1μm).	A
II-j	SDB REF	A reaction time of 7 days is indicated. No further (kinetic) information is provide.	C/D
II-k	REF	It is indicated that agitated method is shaker-table water bath and ～130 oscillations per minute for 48 hours.	A/B
II-l	SDB	Initial Cs concentration is not varied.	C/D
II-m	REF	It is indicated that experimental vessel is polycarbonate centrifuge tubes.	B
II-n	SDB	No information about error is indicated.	C/D
II-o	SDB	No parameter variation had been done.	D

Data table Cs/6: REF: Meijer et al. (1990)
JAEA-SDB version 3.1 DATA: Cs/Tuff, #62101～62108
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided. Water type, pH, initial RN concentration and contact time are missing.	No

Data table Cs/7: REF: Meyer et al. (1990)
JAEA-SDB version 3.1 DATA: Cs/Tuff, #56393～56407
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	REF	A table with K_d values is provided.	class 1
II-a	SDB REF	As solid phase tuff is indicated. SSA and CEC are not given. Some details of the composition of geological materials are reportedly given in Meyer et al. (1987).	C/D
II-b	SDB	Final pH is indicated.	A
II-c	SDB REF	An air/CO_2 atmosphere is indicated. Experiments were conducted in an atmosphere box with an overpressure of CO_2 to buffer the solution pH. System was pre-equilibrated. Cs in the oxidation state (I) is reported. Cs is not redox sensitive.	A/B
II-d	REF	Experiments had been performed in NaCl solution with a small amount of $NaHCO_3$. Final solution composition is not reported.	C/D
II-e	SDB	It is indicated that no temperature is given.	C/D
II-f	SDB REF	The solution/solid ratio is reported as 0.2[g] solid, 2[mL] solution. Since SSA is not given, the criterion cannot be evaluated.	C/D
II-g	SDB	The %-sorbed can be calculated with K_d and L/S ratio: ・#56393, #56394, #56398, #56406, #56407 ・#56401～56405 ・#56395～56397, #56399, #56400	 C/D B A
II-h	SDB	An initial Cs concentration of 5.00×10^{-9} M is indicated. Solubility limit has not been estimated. Cs is not solubility limited.	A
II-i	SDB REF	As separation method centrifugation is indicated. Centrifugation 9000[rcf] for 30 minutes, after decantation a second centrifugation was done for 15 minutes.	C/D (update SDB)
II-j	SDB REF	Contact times of 0.25～14 days are indicated. Equilibrium was reached within a few days. The experiments with a reaction time of 0.25 and 4 days may be haven not reached equilibrium. ・#56393, #56394, #56399, #56400, #56402, #56405 ・#56395～56398, #56401, #56403, #56404, #56406, #56407	 A/B unreliable
II-k	REF	Not reported.	C/D
II-l	REF	No isotherms and no variations of Cs concentrations are indicated.	C/D
II-m	REF	No information about vessel material is reported. No information about consideration of losses to vessel walls is given.	C/D
II-n	REF	It is indicated that there is no error information available.	D
II-o	REF	No variations of conditions are indicated.	D

Data table Cs/8: REF: Park et al.(1992)
JAEA-SDB version 3.1 DATA: Cs/tuff, #57249～57251
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		**Evaluation**	**Rating**
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	SDB	A table with K_d values is given.	class 1
II-a	SDB	Tuff is indicated as mineral phase; rough mineral composition and specific surface areas (BET) of the three grain size fractions are provided. Particle sizes of the fractions are given.	B
II-b	SDB	Initial pH values are reported. It is not reported at which state of the experiment the pH was measured. The pH is listed in the table of groundwater composition. Since the synthetic groundwater is a well buffered system, rating B is given.	B
II-c	SDB REF	It is indicated that redox conditions are not reported. No inert gas atmosphere is reported. Therefore it is assumed that the experiments were conducted under ambient conditions. Cs is not redox sensitive.	A/B
II-d	SDB REF	The initial composition of the solution is given (synthetic groundwater). The composition of synthetic groundwater reported simulates the chemical composition of equilibrated natural groundwater from the tuff sampled.	A/B
II-e	SDB	It is indicated that a reaction temperature of 25℃ had been used.	A/B
II-f	SDB	The BET surfaces of the tuff in three different grain sizes are indicated to be >30$[m^2/g]$. Rating is done based on the calculated surface area of the added sorbent indicated. In all cases it is >5 $[m^2]$ per reaction vessel.	A/B
II-g	REF	The sorption values were calculated based on the information given in the SDB. The sorption values for all datapoints are >99.5%.	C/D
II-h	SDB	Initial Cs-concentration of 8.4×10^{-10} M is indicated. Cs is not solubility limited.	A
II-i	SDB REF	Centrifugation is reported as separation method. It is reported that samples had been centrifuged for 10 minutes at 3,000[rpm].	C/D
II-j	SDB REF	A reaction time of 14 days is indicated. For the three experiments the distribution ratios with time are illustrated in graphs with logarithmic time scales. It is unclear if near-equilibrium was reached.	C/D
II-k	REF	Shaking is reported as agitation method.	A/B
II-l	REF	No isotherm, no variation of the Cs concentration and no variation of the L/S is indicated.	C/D
II-m	REF	It is indicated that glass vessels had been used for the experiments and corrections for sorption on the vessel walls had been performed based on a blank test.	C/D
II-n	SDB	No replicates and no error estimates are reported.	D
II-o	REF	Cs sorption on three different grain size fractions of the same tuff sample is reported.	C

Data table Cs/9: REF: Rogers and Meijer (1993)
JAEA-SDB version 3.1 DATA: Cs/Tuff, #58575～58613
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	**Evaluation**	**Rating**
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB REF	Not all mandatory information is provided; it is indicated that the initial RN concentration is missing. No further information could be found.	No

Data table Cs/10: REF: Thomas (1987)
JAEA-SDB version 3.1 DATA: Cs/Tuff, #60430～60448
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	**Evaluation**	**Rating**
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB	Not all mandatory information is provided: pH, Eh is missing, atmosphere conditions are indicated.	No

Data table Cs/11: REF: Yamamoto et al.(1989)
JAEA-SDB version 3.1 DATA: Cs/Tuff, #61769
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	**Evaluation**	**Rating**
I-a.1 SDB	Separation fields are not completed.	No
I-a.2 SDB	Separation information is not completed.	No

3.1.3 Neptunium

Data table Np/1: REF: Barney(1982)
JAEA-SDB version 3.1 DATA: Np/Tuff, #45042～45061
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is completed.	Yes
I-b	SDB	A table with K_d values is provided.	class 1
II-a	SDB REF	SSA and CEC of tuff are given. The minerals present are reported. Further composition is not reported.	B
II-b	SDB	Initial and final pH are indicated.	A
II-c	SDB REF	Indicated redox state corresponds to the information in the reference. These experiments are carried out under aerobic condition and controlled condition. It is used hydrazine as reducing agent under controlled condition. ・#45042～45048, #45050, #45052, #45054 : Np(V) ・#45049, #45051, #45053, #45055～45061 : Np(IV)	A C/D
II-d	SDB	Experiments had been performed in synthetic groundwater. Final solution composition is not indicated.	C/D
II-e	SDB	It is indicated that experiments has been performed at 23℃.	A/B
II-f	SDB REF	The amount of solution/solid ratio is reported. Surface area 188[m^2/g] in the tuff sample is available.	A/B
II-g	REF	The %-sorbed can be calculated with K_d and L/S ratio. This data is 5～95%.	A
II-h	SDB REF	Initial Np concentrations are 5.71×10^{-8}～6.54×10^{-8} [M] under aerobic condition, 6.31×10^{-8}～6.76×10^{-8} [M] under reducing condition. Based on calculations using the thermodynamic database developed by JAEA (100331c1.tdb), in the case of aerobic condition, solubility of Np is $>1.95\times10^{-3}$ [M], in the case of reducing condition, $<8.0\times10^{-9}$ [M]. ・#45042～45048, #45050, #45052, #45054 : Np(V) ・#45049, #45051, #45053, #45055～45061 : Np(IV)	A unreliable
II-i	SDB REF	As separation method filtration is indicated. Filtration through 30 Angstrom Amicon 50A ultrafilter is reported.	B
II-j	SDB	A contact time of 14 days is indicated.	C/D
II-k	REF	Continuous shaking (180 oscillations/min), method not specified.	A/B
II-l	SDB	Isotherms were determined at different temperatures.	A
II-m	REF	Polycarbonate centrifuge tube 50[mL], sorption on vessel walls not considered.	B
II-n	SDB	There is no error information reported.	D
II-o	SDB	Variation of solution composition (Na concentration etc. variations).	C

Data table Np/2: REF: Baston et al. (1997) and Berry et al.(2007)
JAEA-SDB version 3.1 DATA: Np/Tuff, #46828～46831, #46940, #46941
GUIDELINE: Revision 4b (May 19, 2005)
*REMARK: Update of SDB required for checkpoints II-a, II-c, II-d and II-i.

Checkpoint		**Evaluation**	**Rating**
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	SDB	A table with K_d values is given.	class 1
II-a	SDB	As solid phase, tuff is indicated. Major mineral composition is reported for datapoints #46940 and #46941 only, but is also valid for datapoints #46828～46831. Surface characteristics are not given. Since minor mineral composition is not indicated, surface characteristics cannot be estimated.	C/D
II-b	SDB REF	Final pH values are reported. No use of any pH buffer is reported.	A
II-c	SDB REF	The oxidation state of Np is not reported. It is indicated that experiments had been performed under nitrogen atmosphere with dithionite as reducing agent. Final Eh values are indicated. It is reported that Np(V) was reduced to Np(IV) with sodium dithionite prior to the adsorption experiments. O_2 levels were reportedly < 1[ppm]. All solutions had been de-oxygenated before experimentation. Levels of dithionite were monitored during the experiments, and were corrected where needed.	C/D
II-d	SDB REF	As water type tuff equilibrated distilled water is indicated. Only for datapoints #46940 and #46941 the final solution composition of equilibration at 60℃ resp. at room temperature is provided. The final solution compositions for datapoints #46828～46831 are identical to the compositions of datapoints #46940 and #46941.	A/B
II-e	SDB	It is indicated that experiments had been done at 25 and 60℃.	A/B
II-f	SDB	It is indicated that an L/S ratio of 5 with 300[mL] solution and 6[g] of solid phase had been used for the experiments.	A/B
II-g	SDB	Sorption values are calculated from K_d and L/S ratios: ・#46828 (97% sorption) ・#46829～46831, #46940, #46941 (>98% sorption)	A C/D
II-h	SDB REF	Initial Np concentration of 6.0×10^{-9} M is indicated. Based on speciation calculations with Phreeqci 2.14.3 using the thermodynamic database developed by JAEA (100331c1.tdb), the initial Np concentration may have been at, or slightly above, the solubility limit. The solutions were pre-filtered (0.45 μm) before being equilibrated with the solid. Presumably, Np-precipitates would have been removed in this way.	C/D
II-i	SDB REF	Filtration through 10,000 MWCO or 0.45 μm membranes, or centrifugation at 1100[g] for 3 hours is indicated. Three liquid/solid separation techniques were employed: 1. Centrifugation at 1100[g] for 15 minutes with aliquots being removed from near the surface of the supernatant liquid 2. Centrifugation followed by filtration through a 0.45 μm filter	A

		3. Centrifugation followed by filtration first through a 0.45 μm filter, and then through a 10,000 MWCO filter K_d values were all in the same range, independent of the applied separation technique.	
II-j	SDB	A contact time of 120 days is indicated.	C/D
II-k	REF	Gentle agitation on a shaker is reported.	A/B
II-l	SDB	No variation in L/S or Np concentration had been performed.	C/D
II-m	REF	The experiments had been carried out in polypropylene centrifuge tubes. Sorption on vessel walls was not tested in case of Np. However, tests with Cm suggest that sorption on vessel walls can be neglected.	B
II-n	SDB REF	Error estimates are given, but it is indicated that no replicate measurements are available. Error estimates are given, which are based on counting statistics only. Neptunium experiments were carried out in duplicate.	B
II-o	SDB	Temperature had been varied (and as a result of the temperature change also the pH varied).	C

Data table Np/3: REF: Daniels et al.(1982)
JAEA-SDB version 3.1 DATA: Np/Tuff, #49763～49769
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		**Evaluation**	**Rating**
I-a.1	SDB	Initial Np concentration fields are not completed.	No
I-a.2	SDB	Initial Np concentration information is not completed.	No

Data table Np/4: REF: Nakayama et al.(1986)
JAEA-SDB version 2 . DATA: Np/Tuff, #56839～56844
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		**Evaluation**	**Rating**
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is completed.	Yes
I-b	SDB	A table with K_d values is provided.	class 1
II-a	SDB	Information of physic-chemical properties about tuff is not reported. However, source, mesh size and specific surface area are reported.	C/D
II-b	SDB REF	Final pH is indicated. pH is adjusted before sorption experiments, during sorption experiment pH is not adjusted.	B
II-c	SDB REF	It is not indicated about redox condition. Sorption experiment is supposed to be performed under aerobic condition. So, redox state of Np is considered as Np(V).	A/B
II-d	SDB REF	There is no information about final solution composition and physico-chemical properties of tuff. It is impossible that final solution composition is predicted.	unreliable

Data table Np/5: REF: Rogers and Meijer(1993)
JAEA-SDB version 3.1 DATA: Np/Tuff, #58614～58648
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is completed.	Yes
I-b	SDB	A table with K_d values is provided.	class 1
II-a	SDB	Information of physic-chemical properties about tuff is not reported. However, source, particle size and specific surface area are reported.	C/D
II-b	SDB REF	Final pH is indicated. No more information is reported as pH adjustment during sorption experiment.	B
II-c	SDB REF	It is not indicated about redox condition. Sorption experiment is supposed to be performed under aerobic condition. So, redox state of Np is considered as Np(V).	A/B
II-d	SDB REF	There is no information about final solution composition and physico-chemical properties of tuff. It is impossible that final solution composition is predicted.	unreliable

Data table Np/6: REF: Tanaka and Muraoka(1999)
JAEA-SDB version 3.1 DATA: Np/Tuff, #62315
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information are completed.	Yes
I-b	SDB	A figure with log K_d values is provided.	class 5
II-a	SDB	Physico-chemical properties of the tuff samples are indicated.	A
II-b	SDB	It is indicated pH of solution equilibrated with tuff samples. However pH of solution after sorption experiment is not reported.	B
II-c	SDB REF	It is reported that Eh is 450[mV]. It is considered that this experiment is carried out under air condition. So, redox state of Np is considered as Np(V).	A/B
II-d	SDB	Initial solution composition is indicated. The final solution composition is not reported, but can be estimated based on major mineral components and initial solution composition.	A/B
II-e	SDB	It is indicated that the temperature is controlled at 25℃ by using a water jacket.	A/B
II-f	SDB REF	It is indicated that L/S is 10[cm^3]/0.5[g]. It is considered that quantity of solid is little.	A/B
II-g	REF	The %-sorbed can be calculated with K_d and L/S ratio. This data is 5～95%.	A
II-h	SDB REF	A value of 1.62×10^{-3} [M] is indicated as initial Np concentration. Based on calculations using the thermodynamic data given JAEA (100331c1.tdb), solubility of Np(V) in the given equilibrated solution are 2.093×10^{-3} [M].	A
II-i	SDB	Filtration through 0.45 μm membranes is indicated.	B
II-j	SDB REF	A reaction time of 7 days is indicated. No further (kinetic) information is provide.	C/D

II-k REF	It is indicated that the solution containing the sample is gently agitated on a shaker at 60[rpm] for 168 hours.	A/B
II-l SDB	Initial Np concentration is not varied.	C/D
II-m REF	No information about vessel is indicated.	C/D
II-n SDB	No information about error is indicated.	C/D
II-o SDB	No parameter variation had been done..	D

Data table Np/7: REF: Tanaka et al.(1998)
JAEA-SDB version 3.1 DATA: Np/Tuff, #62374, #62380, #62390～62394, #62422～62426, #62453～62458
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint	Evaluation	Rating
I-a.1 SDB	All mandatory fields are completed.	Yes
I-a.2 SDB	All mandatory information is provided.	Yes
I-b SDB REF	It is indicated that K_d values are read out of a scanned figure. The diagrams are provided with logarithmic K_d values.	class 5
II-a SDB REF	As solid phase tuff is indicated. Chemical composition and CEC are reported. Although tuff is a natural sample, no mineral composition is indicated.	C/D
II-b SDB REF	Initial and final pH are reported. pH is adjusted using NaOH and HCl (data point #62390～62394). Other data points are not adjusted.	A
II-c SDB REF	It is indicated that experiments had been done under aerobic conditions and final Eh values of 310[mV] are given. So, redox state of Np is considered as Np(V).	A/B
II-d SDB	As water type tuff equilibrated solution is indicated. A table with the final solution composition is provided for each data point.	A/B
II-e SDB	A temperature of 25℃ is indicated.	A/B
II-f SDB REF	It is indicated that 0.1[g] of solid was added to 10[mL] of solution. BET values are not reported. Since tuff typically has a high specific surface area it is assumed that 0.1[g] of solid per reaction vial is enough.	A/B
II-g REF	Rating is done based on %-sorbed values calculated from the information given in the SDB: ・#62374, #62380, #62392～62394, #62422, #62423, #62453～62457 ・#62390, #62391, #62424～62426, #62458	 A B
II-h SDB REF	An initial Np concentration of 2.0×10^{-4} [M] is indicated. Based on calculations using the thermodynamic data selected by JAEA (100331c1.tdb), solubility of Np(V) in the given equilibrated solution are $>8.2\times10^{-5}$ [M].	A
II-i SDB	It is indicated that filtration with 0.45 μm membrane was applied.	C/D
II-j SDB REF	A reaction time of 7 days is indicated. Separate kinetic measurements demonstrate near-equilibrium was reached at the given reaction time.	A/B
II-k REF	It is indicated that agitation method is shaking by hand during experimental period.	A/B
II-l SDB	No variation in L/S or initial Np concentration had been performed.	C/D

II-m	REF	The experiments were carried out in teflon vessels. There is no information about blank measurements or sorption on vessel walls.	B
II-n	SDB	It is indicated that only one sample measurement had been performed. There is no error information given.	D
II-o	SDB	Np sorption had been measured at different pH values and at different Na and Ca concentrations in test solutions.	B

Data table Np/8: REF: Thomas(1987)
JAEA-SDB version 3.1 DATA: Np/Tuff, #60456～60487
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		**Evaluation**	**Rating**
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	Not all mandatory information is provided: pH, Eh is missing, atmosphere conditions are indicated.	No

3.1.4 Selenium

Data table Se/1: REF: Barney (1982)
JAEA-SDB version 3.1 DATA: Se/Tuff, #45192～45210
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	REF	A table with K_d values is provided.	class 1
II-a	SDB REF	As solid phase tuff is indicated. SSA and CEC are given. The minerals present are reported. Further composition is not reported.	B
II-b	SDB	Initial and end pH are indicated.	A
II-c	SDB REF	Indicated redox state corresponds to the information in the reference. Eh is not reported. These experiments are carried out under aerobic condition and controlled condition. It is used hydrazine as reducing agent under controlled condition. ・#45192, #45194～45198, #45202, #45209, #45210 : Se(-II) ・#45193, #45199～45201, #45203～45208 : Se(VI)	unreliable A/B
II-d	SDB	Experiments had been performed in synthetic groundwater. Final solution composition is not indicated.	C/D
II-e	SDB	It is indicated that experiments has been performed at 23℃.	A/B
II-f	SDB REF	The amount of solution/solid ratio is reported. Surface area 188$[m^2/g]$ in the tuff sample is available.	A/B
II-g	REF	The %-sorbed can be calculated with K_d and L/S ratio. ・#45192 (<5%) ・Others data (5～95%)	C/D A
II-h	SDB	Initial Se concentrations are 2.80×10^{-8} [M] under aerobic condition. Se(VI) is not solubility limited (Azuma et al., 1999). ・#45193, #45199～45201, #45203～45208 : Se(VI)	A
II-i	SDB REF	As separation method filtration is indicated. Filtration through 30 Angstrom Amicon 50A ultrafilter is reported.	B
II-j	SDB	A contact time of 14 days is indicated.	C/D
II-k	REF	Continuous shaking (180 oscillations/min), method not specified.	A/B
II-l	SDB	Isotherms were determined at different temperatures.	A
II-m	REF	Polycarbonate centrifuge tube 50[mL], sorption on vessel walls not considered.	B
II-n	SDB	There is no error information reported.	D
II-o	SDB	Variation of solution composition (Na concentration etc. variations).	C

Data table Se/2: REF: Conca and Triay(1996)
JAEA-SDB version 3.1 DATA: Se/Tuff, #49374～49376
GUIDELINE: Revision 4b (May 19, 2005)
* REMARK: Update of SDB required for I-a.1.

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	SDB	A table with K_d values is provided.	class 1

II-a	SDB	Tuff is indicated as solid phase. Mineralogy is not indicated. Specific surface area is provided.	C/D
II-b	SDB	Final pH values are reported.	A
II-c	SDB REF	It is not reported experimental conditions. However, final Eh is reported (140～150 [mV]). It is considered that redox state of Se is Se(IV).	A/B
II-d	SDB	As water type J-13 Well water is indicated. The final solution composition of the equilibrated groundwater is not provided and cannot be estimated due to lacking mineralogy of the tuff sample.	unreliable

Data table Se/3: REF: Daniels et al. (1982)
JAEA-SDB version 3.1 DATA: Se/Tuff, #49826～49830
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB REF	Not all mandatory information is provided. pH, separation method and redox potential are missing. The initial pH of the solutions used for experimentation and the actual pH during experimentation are not available. It is not clear whether the experimental systems had been at or near equilibrium.	No

Data table Se/4: REF: Shibutani et al. (1994)
JAEA-SDB version 3.1 DATA: Se/Tuff, # 59232～59255
GUIDELINE: Revision 4b (May 19, 2005)
* REMARK: Update of SDB required for checkpoints I-a.2, II-d, II-f and II-h.

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	SDB	It is indicated that K_d values are provided as % sorbed.	class 2
II-a	SDB REF	Tuff is indicated as solid phase. Specific surface area is provided. Mineralogy of used tuff isplagioclases, smectite, clinoptilolite, heulandite, quartz, kaolinite, biotite, gypsum and pyrite, and a little of K-feldspar, illite, sericite, chlorite, amphibole and calcite.	C/D
II-b	SDB	Final pH values are reported (after a contact time of 14 days, which can be assumed to be enough to reach equilibrium).	A
II-c	SDB REF	It is indicated that experiments had been performed in an atmosphere with <1[ppm] of oxygen. It is reported that experiments had been performed under N_2-atmosphere with <1[ppm] of oxygen present. Eh values are not reported. Due to the kinetic stability of added Se(IV) under ambient conditions, rating C/D is applied.	C/D
II-d	SDB REF	As water type 0.01 M NaCl solution is indicated. The final solution composition of the equilibrated groundwater is not provided. The final solution composition is not reported, but can be estimated based on major mineral components and initial solution composition.	C/D
II-e	SDB	Experiments had been conducted at room temperature.	A/B
II-f	SDB	A liquid/solid ratio of 20[mL/g] is reported.	A/B

	REF	The L/S ratio is indicated to be 2.5[mL/g]. With the indicated specific surface area of 57[m^2/g] rating A/B is applied.	
II-g	SDB	The sorption values are calculated from K_d and L/S ratios: ・#59234～59247, #59254, #59255 (26～83% sorption) ・#59248～59253 (96% sorption) ・#59232, #59233 (>99% sorption)	 A B C/D
II-h	SDB	Initial Se concentration is indicated as 1.0×10^{-4} M. According to Phreeqci-calculations using the thermodynamic data in NAGRA-PSI thermodynamic database (Hummel et al., 2002), the reported Se concentration is clearly below the solubility limit.	C/D
II-i	SDB	It is reported that reaction mixtures were filtered with a 10,000 MWCO (Molecular Weight Cut-Off) ultrafilter.	B
II-j	SDB	A contact time of 14 days is indicated. This reaction time is considered to be reasonably long.	C/D
II-k	REF	Agitation method is shaking sometime during experimental period.	A/B
II-l	SDB	No variation in L/S or initial Se concentration is indicated.	C/D
II-m	REF	There is no information about the vessel type used for experimentation. It is indicated that blank measurements had been made, but it is not reported if corrections for sorption on the vessel walls had been performed.	C/D
II-n	SDB	No error estimates are reported. Only one replicate is indicated.	D
II-o	SDB	pH had been varied systematically.	C

Data table Se/5: REF: Thomas (1987)
JAEA-SDB version 3.1 DATA: Se/Tuff, #60506～60526
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		**Evaluation**	**Rating**
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	Not all mandatory information is provided: pH, Eh is missing, atmosphere conditions are indicated.	No

3.1.5 Thorium

Data table Th/1: REF: Baston et al.(1994)
JAEA-SDB version 3.1 DATA: Th/Tuff, #46560～46563
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	Eh fields are not completed.	Yes
I-a.2	SDB	All mandatory information is completed.	Yes
I-b	SDB	A graph with log K_d is provided.	class 5
II-a	SDB	Tuff as solid phase is indicated. SSA and CEC are not given. The minerals present are reported. Further composition is not reported.	B
II-b	SDB REF	Final pH value is given. One tube is monitored regularly over a 60～100 days period to monitor the pH and, if necessary, pH readjustments are carried out in all tubes (tripulicated).	A
II-c	SDB	All experiments were carried out in nitrogen atmosphere glove boxes. Th(IV) is not redox sensitive.	A/B
II-d	SDB	The composition of the synthetic groundwater is not given.	unreliable

Data table Th/2: REF: Ishii et al.(2001)
JAEA-SDB version 3.1 DATA: Th/Tuff, #65713, #65714
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	Eh fields are not completed.	Yes
I-a.2	SDB	All mandatory information is completed.	Yes
I-b	SDB	A table with K_d values is provided.	class 1
II-a	SDB	Tuff as solid phase is indicated. SSA and CEC are given. The chemical composition is reported.	A
II-b	SDB	Initial and equilibrium pH is indicated. It is not carried out pH adjustments.	A
II-c	SDB REF	Redox conditions are not reported. It is considered that experiment is carried out under air condition. Th(IV) is not redox sensitive.	A/B
II-d	SDB REF	An initial liquid composition is indicated. The final solution composition is not reported, but can be estimated based on major mineral components and initial solution composition.	A/B
II-e	SDB	A temperature of 15℃ is reported.	A/B
II-f	SDB	In the case of Th, solid/solution is reported 1[g]/50[mL] or 1[g]/100[mL].	A/B
II-g	REF	The %-sorbed can be calculated with K_d and L/S ratio. All data are 5～95%.	A
II-h	SDB REF	Initial Th concentration is decided by solubility calculation using solution composition and thermodynamic data.	A
II-i	SDB	Filtration through 0.45 μm membranes is indicated.	B
II-j	SDB REF	A reaction time of 14 days is indicated. No further (kinetic) information is provide.	C/D
II-k	REF	Samples are agitated continuously by a stirrer (50 strokes/minute) and shaking (1 times/day).	A/B

II-l	SDB	It is carried out three different initial Th concentrations.	B
	REF	It is not indicated Th sorption isotherms.	
II-m	REF	It is reported that reaction vessel is teflon or polypropylene. After sorption experiment, it is confirmed that Th is not sorbed onto vessel wall.	A
II-n	SDB	It is carried out in triplicate. It is reported K_d error.	A
II-o	SDB	It is carried out in different solution and three different initial Th concentrations.	B

Data table Th/3: REF: Thomas (1987)
JAEA-SDB version 3.1 DATA: Th/Tuff, #60554～60563
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	Not all mandatory information is provided: pH, Eh is missing, atmosphere conditions are indicated.	No

Data table Th/4: REF: Ueta (1998)
JAEA-SDB version 3.1 DATA: Th/tuff, #61621～61628
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	SDB	K_d values are provided in [mL/g].	class 1
II-a	SDB	As solid phase tuff from Gifu-ken Tono is indicated. Major mineralogy and surface characteristics of the tuff are not reported.	C/D
	REF	A surface area of 57[m^2/g] is reported.	
II-b	SDB	Initial and final pH values are reported.	A
II-c	SDB	Redox state of Th is not indicated. Experiments had been perfomed under aerobic conditions. Eh values are not reported. Th is not redox sensitive.	A/B
II-d	SDB	Experiments had been performed in seawater and distilled water. Final solution compositions are not reported: ・#61621～61624: due to lacking mineralogy the solution composition after equilibration with distilled water cannot be estimated.	unreliable
		・#61625～61628: it is supposed that no essential changes take place with seawater.	C/D
	REF	Carbonate concentrations of the solutions are reported. All solutions had been analysed after pre-equilibration.	
II-e	SDB	A temperature of 25℃ is indicated.	A/B
II-f	SDB	It is indicated that 1[g] of solid per reaction vial was used. With the indicated BET the total solid surface is 57[m^2/vial].	A/B
II-g	REF	The sorption values are calculated from K_d and L/S ratios. For all datapoints the sorption is >98%.	C/D
II-h	SDB	An initial Th concentration of 4.0×10^{-8} M is indicated. Based on speciation calculations with Phreeqci 2.14.3 using the thermodynamic data in the NAGRA-PSI thermodynamic database (Hummel et al. 2002) and the JNC-TDB_011213c2, the initial Th	unreliable

	concentration is clearly above the solubility limit and datapoints are considered as unreliable.	

Data table Th/5: REF: Ueta et al. (1999)
JAEA-SDB version 3.1 DATA: Th/tuff, #61629～61636
GUIDELINE: Revision 4b (May 19, 2005)

Checkpoint		Evaluation	Rating
I-a.1	SDB	All mandatory fields are completed.	Yes
I-a.2	SDB	All mandatory information is provided.	Yes
I-b	SDB	A table with K_d values is given.	class 1
II-a	SDB	As solid phase tuff from Gifu-ken Tono is indicated. Major mineralogy and surface characteristics of the tuff are not reported.	C/D
II-b	SDB	Initial and final pH values are reported.	A
II-c	SDB	Redox state of Th is not indicated. Experiments had been performed under aerobic conditions. However, Th is not redox sensitive.	A/B
II-d	SDB	Experiments had been performed in seawater and distilled water. Final solution compositions are not reported: ・#61629～61632: due to lacking mineralogy the solution composition after equilibration with distilled water cannot be estimated. ・#61633～61636: it is supposed that no essential changes take place with seawater.	unreliable A/B
II-e	SDB	A temperature of 25℃ is indicated.	A/B
II-f	SDB REF	It is indicated that 2[g] of tuff and 100[mL] of solution was used for the experiments. With the indicated BET for tuff from Gifu-ken Tono in Ueta (1998) the total surface/vial is 114[m^2].	A/B
II-g	SDB	The sorption values are calculated from K_d and L/S ratios. They are 63～64% for the experiments with seawater #61633～61636.	A
II-h	SDB	An initial Th concentration of 2.0×10^{-9} M is indicated. Based on speciation calculations with Phreeqci 2.14.3 using the thermodynamic data in the NAGRA-PSI thermodynamic database (Hummel et al. 2002), the initial Th concentration is below the solubility limit but less than a factor of 5.	B
II-i	SDB	Similar results were obtained by filtration over 0.45 µm membranes and filtration over a 10,000 MWCO filter (molecular weight cut-off).	A
II-j	SDB	A contact time of 30 days is indicated.	C/D
II-k	REF	The samples were shaken.	A/B
II-l	SDB	No variation in L/S or initial Th concentration is indicated.	C/D
II-m	REF	Type of reaction vial is not reported. Corrections for sorption on vessel wall have been done. Sorbed Th of the reaction vial was extracted by acid leaching and was corrected in K_d calculations.	C/D
II-n	SDB	・No error information is available for data points #61633, #61636. ・Error information based on duplicate measurements is available for datapoints # 61634, #61635	D A
II-o	SDB	No parameter variation is indicated.	D

3.2 Criteria III

Only the entries for Am, Np, Se and Th classified as reliable are being considered for criteria III. All unreliable entries, or entries where classification according to criteria I and II could not be completed, are excluded. Entries for Cs are not included in this analysis because the final cation concentration would have to be estimated or calculated in most cases before a meaningful comparison can be done.

3.2.1 Evaluation of data for americium

The following entries are evaluated in this section; the respective data are shown in Figure 3.2.1.

Reference	Data table	Solid phase
Baston et al.(1995b)	Am/2	tuff
Ikeda and Amaya(1998)	Am/9	tuff
Tanaka and Muraoka(1998)	Am/12	tuff
Tanaka et al.(1998)	Am/13	tuff

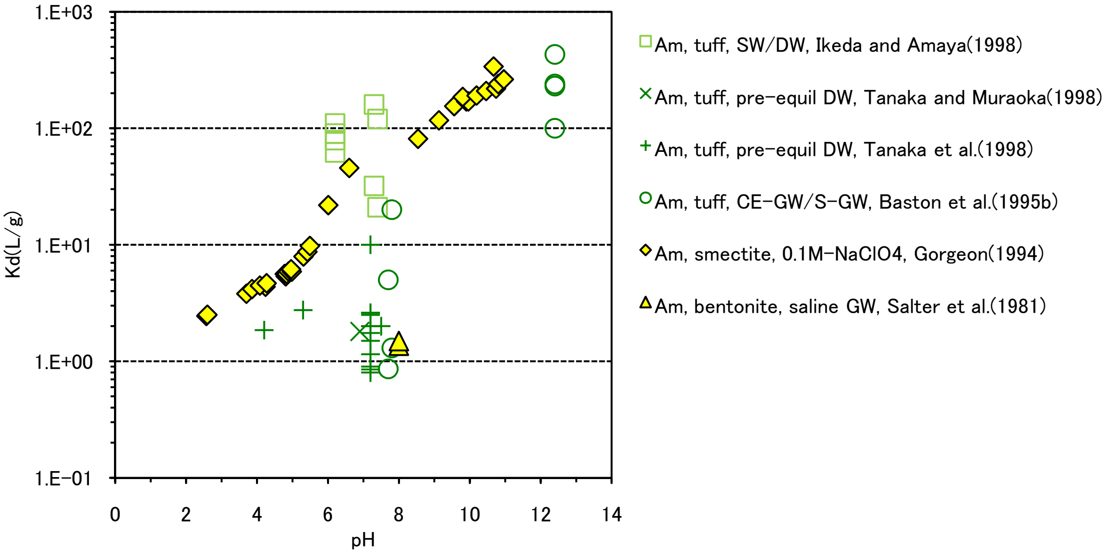

Figure 3.2.1 Overview of sorption data for Am on tuff. For comparison, sorption data for Am on smectite and bentonite are also shown. SW = seawater, DW = distilled water, CE-GW = concrete-equilibrated ground water, S-GW = synthetic ground water, GW = ground water.

Figure 3.2.1 summarizes the data for the sorption of Am on tuff, with those on smectite and bentonite. The K_d values measured by Tanaka et al. (1998) and Baston et al. (1995b) show a fairly clear trend of increasing K_d with increasing pH, which is consistent with the trend for smectite. The variation of K_d data observed at pH around 7 in Tanaka et al. (1998) can be explained by the difference of ionic strength. Considering the differences of experimental conditions, all K_d values of Am for tuff are evaluated as being consistent with each other, and with the data for smectite and bentonite. Although the detailed mineralogical compositions of the tuff samples are not known, it can be assumed that tuff often contains clay minerals such as smectite as weathering products, resulting in the consistent sorption behavior.

3.2.2 Evaluation of data for selenium

The following entries are evaluated in this section; the respective data are shown in Figure 3.2.2.

Reference	Data table	Solid phase
Barney(1982)	Se/1	tuff
Shibutani et al. (1994)	Se/4	tuff

Figure 3.2.2 shows the available data for Se(IV)/Se(VI) sorption on tuff and related minerals (clay minerals and Fe minerals). Although K_d values lie in wide ranges, a fairly clear trend of decreasing K_d with increasing pH was found. It is difficult to evaluate because of lack of detailed information on the mineralogy of the tuff for both Shibutani et al. (1994) and Barney (1982), but they are approximately consistent with each other. As discussed in Shibutani et al. (1994), comparison of pH dependencies between tuff and its constituent minerals suggests that Fe minerals such as Fe-oxyhydroxide and pyrite contribute to sorption behavior of Se on tuff. Assuming that the data for granodiorite by Sato et al. (1997) refer to Se(IV), it would seem reasonable that the minerals in granodiorite have a lower sorption capacity for anions than tuff.

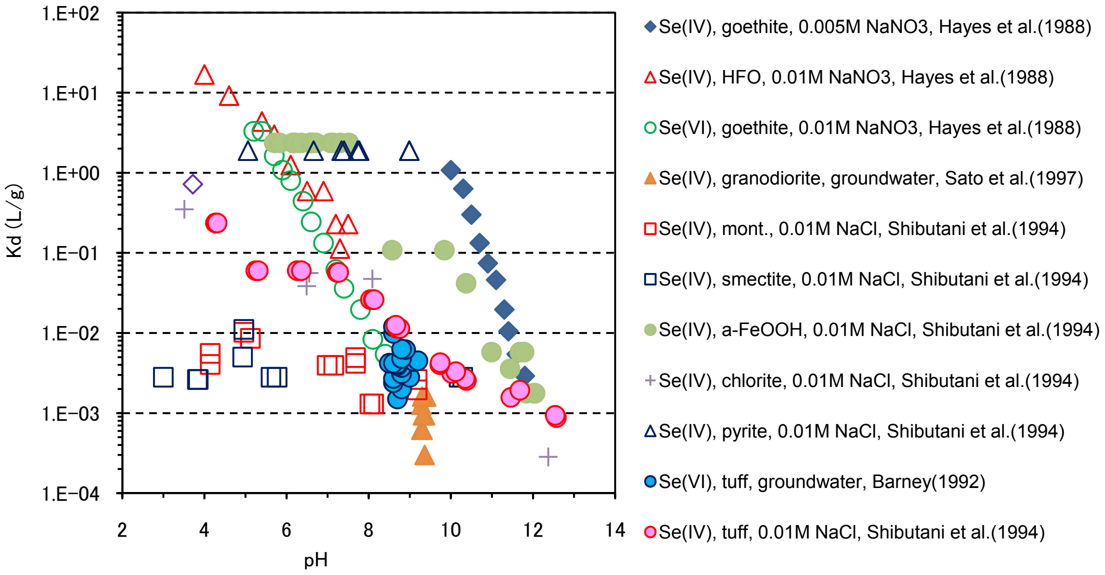

Figure 3.2.2 Overview of sorption data for Se on tuff. For comparison, sorption data for goethite, HFO and granodiorite are also shown. HFO = hydrous ferric oxide. Mont. = montmorillonite

3.2.3 Evaluation of data for thorium and neptunium

The following entries are evaluated in this section; the respective data are shown in Figure 3.2.3.

Reference	Data table	Solid phase
Ueta et al.(1999)	Th/5	tuff
Baston et al.(1997) and Berry et al.(2007)	Np/2	tuff

Figure 3.2.3 shows the available data for Th(IV)/Np(IV) sorption on tuff and related minerals (clay minerals and Fe minerals). It is noted that K_d values for tuff of Th(IV) by Ueta et al. (1999) and Np(IV) by Baston et al. (1997, 1999) are fairly consistent, and are similar with those on granodiorite and bentonite, reported by same authors. In comparison with the K_d values of Th on pure montmorillonite (SWy-1) obtained by Bradbury and Baeyens (2003) and those on goethite by Hunter et al. (1988), relatively low sorption on tuff has been observed for Th and for Np(IV). In all these cases, solution chemistry had been relatively complex as well as mineralogy of tuff samples, including presumably significant concentrations of carbonate, silicate, etc. Because the influence of such ligands on Th sorption is not known precisely, due to the lack of systematic sorption data, these data cannot be evaluated conclusively according to Criterion III, but they appear to be consistent among each other.

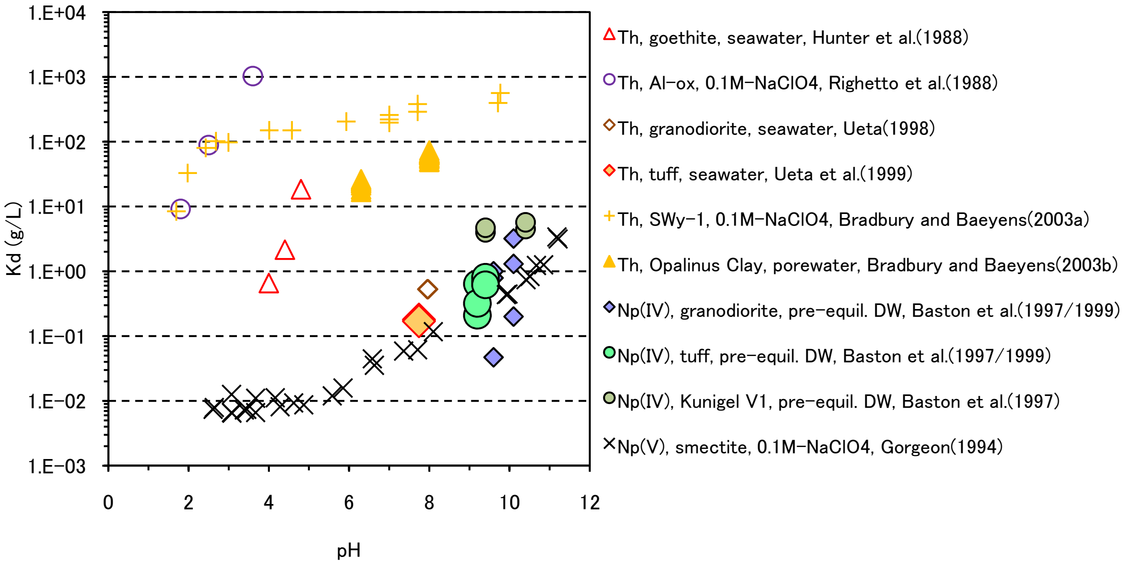

Figure 3.2.3 Overview of sorption data for Th and Np(IV) on tuff. For comparison, sorption data for Th and Np(IV), as well as for Am on metal oxide minerals, granitic rocks, various clays and clay minerals are also shown. DW = distilled water, GW = ground water, SBPW = synthetic bentonite porewater.

4. Summary

The QA/classification of selected entries in the JAEA-SDB, focusing tuff existing widely in geological environment, was done following the approach/guideline defined in our previous report. As a result, the reliability of 560 K_d values was evaluated and classified. The QA/classification for about 27.8 % for all K_d data (56.2 % for 5 key nuclides- Am, Cs, Np, Se, Th) in JAEA-SDB has been completed.

Based on the results of the fourth application of classification guideline to K_d data for tuff system (1st-bentonite, 2nd-mudstone, 3rd-granite), some conclusions can be drawn;

- The classification guideline allows a suitable classification of the K_d values on the basis of the completeness of documented key information and the quality of the underlying experimental methods and conditions.
- The classification scheme made it possible to obtain quick overview of the available data, and to provide suitable access to the respective K_d values for the PA-related K_d-setting.
- Finaly, JAEA-SDB including QA information should be repeatedly tested through the application to various rocks and geochemical conditions, for example, sandstone and basaltic rocks.

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The notation of reference is according to JAEA-SDB reference, considering relation with JAEA-SDB.

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Appendix

Summary tables for K_d classification

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I – Completeness of documentation and type of Kd
Rating ⇒ I–a: Yes/No, I–b: class 1–6

II – Technical and scientific quality of reported data
Checkpoints ⇒ level: A–D (numerical value: 3–0)/unreliable Rating ⇒ class1–6/unreliable

III – Consistency

Datapoint	Reference	I–a.1	I–a.2	Rating I–a	Rating I–b	II–a solid phase	II–b pH	II–c redox condition	II–d solution composition	II–e temperature	II–f S/W	II–g sorptive value	II–h initial [RN]	II–i phase separation	II–j reaction time	II–k agitation	II–l RN loading	II–m reaction vessels	II–n error estimates	II–o parameter variation	Rating II	comment/rating	Operator	Data	Classification Guideline	
44934	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44935	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44936	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44937	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44938	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44939	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44940	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44941	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44942	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44943	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44944	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44945	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44946	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44947	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44948	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44949	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44950	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44951	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44952	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
44953	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	B)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/1
46684	Baston et al.(1995b)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	C/D)	A/B)	B)	A)	unreliable							unreliable	consistent with independent data	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/2
46685	Baston et al.(1995b)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	C/D)	A/B)	C/D)	A)	A)	C/D)	A/B)	C/D)	A)	A)	D)	class 2	consistent with independent data	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/2
46686	Baston et al.(1995b)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	C/D)	A/B)	A)	A)	unreliable							unreliable	consistent with independent data	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/2
46687	Baston et al.(1995b)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	C/D)	A/B)	C/D)	A)	A)	C/D)	A/B)	C/D)	A)	A)	D)	class 2	consistent with independent data	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/2
46688	Baston et al.(1995b)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	C/D)	A/B)	C/D)	A)	A)	C/D)	A/B)	C/D)	A)	A)	D)	class 2	consistent with independent data	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/2
46689	Baston et al.(1995b)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	C/D)	A/B)	C/D)	A)	A)	C/D)	A/B)	C/D)	A)	A)	D)	class 2	consistent with independent data	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/2
46690	Baston et al.(1995b)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	C/D)	A/B)	C/D)	A)	A)	C/D)	A/B)	C/D)	A)	A)	D)	class 2	consistent with independent data	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/2
46691	Baston et al.(1995b)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	C/D)	A/B)	C/D)	A)	A)	C/D)	A/B)	C/D)	A)	A)	D)	class 2	consistent with independent data	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/2
65952	Baston et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	A/B)	C/D)	C/D)	B)	B)	C/D)	A/B)	C/D)	A)	C)	D)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/3
65953	Baston et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	A/B)	C/D)	C/D)	B)	B)	C/D)	A/B)	C/D)	A)	C)	D)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/3
65954	Baston et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	A/B)	C/D)	C/D)	B)	B)	C/D)	A/B)	C/D)	A)	C)	D)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/3
65955	Baston et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	A/B)	C/D)	C/D)	B)	B)	C/D)	A/B)	C/D)	A)	C)	D)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/3
65956	Baston et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	A/B)	C/D)	C/D)	B)	B)	C/D)	A/B)	C/D)	A)	C)	D)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/3
65957	Baston et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	A/B)	C/D)	C/D)	B)	B)	C/D)	A/B)	C/D)	A)	C)	D)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/3
46912	Berry et al.(2007)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	A)	unreliable							unreliable	N.E.	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/4
46913	Berry et al.(2007)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	A)	unreliable							unreliable	N.E.	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/4
46914	Berry et al.(2007)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	A)	unreliable							unreliable	N.E.	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/4
46915	Berry et al.(2007)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	A)	unreliable							unreliable	N.E.	S. Kunze/M. Ochs, BMG	February 2008	Revision 4b (May 19, 2005)	Am/4
49383	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49384	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49385	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49386	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49387	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49388	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49389	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49390	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49391	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49392	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49393	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49394	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49395	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49396	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49397	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49398	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49399	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49400	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49401	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
49402	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/5
50763	Erdal et al.(1978)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/6
50764	Erdal et al.(1978)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/6
50765	Erdal et al.(1978)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/6
50766	Erdal et al.(1978)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/6
50767	Erdal et al.(1978)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/6
50768	Erdal et al.(1978)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/6
50917	Erdal et al.(1979d)	Yes	No	no (can not be used)																	unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/7
50922	Erdal et al.(1979d)	Yes	No	no (can not be used)																	unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/7
51063	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51064	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51065	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51066	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51067	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51068	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51069	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51070	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51071	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51072	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51073	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51074	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51075	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	unreliable														unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51076	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51077	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51078	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51079	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51080	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51081	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51082	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51083	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51084	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51085	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51086	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	unreliable														unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51087	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51088	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51089	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51090	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51091	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51092	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51093	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51094	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51095	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51096	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51097	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51098	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51099	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51100	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51101	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51102	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51103	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51104	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51105	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51106	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51107	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51108	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51109	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51110	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51111	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51112	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8
51113	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Am/8

		I – Completeness of documentation and type of Kd Rating ⇒ I–a: Yes/No, I–b: class 1–6				II – Technical and scientific quality of reported data Checkpoints ⇒ level: A–D (numerical value: 3–0)/unreliable Rating ⇒ class1–6/unreliable																III – Consistency	Operator	Data	Classification Guideline
Datapoint	Reference	I–a.1	I–a.2	Rating I–a	Rating I–b	II–a solid phase	II–b pH	II–c redox condition	II–d solution composition	II–e temperature	II–f S/W	II–g sorptive value	II–h initial [RN]	II–i phase separation	II–j reaction time	II–k agitation	II–l RN loading	II–m reaction vessels	II–n error estimates	II–o parameter variation	Rating II	comment/rating			
51114	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51115	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51116	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51117	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51118	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51119	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51120	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51121	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51122	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51123	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51124	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51125	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51126	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51127	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51128	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51129	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51130	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51131	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51132	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51133	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51134	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51135	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51136	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51137	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51138	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51139	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51140	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
51141	Erdal (1980)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/8
53543	Ikeda and Amaya(1998)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	A)	A)	C/D)	C/D)	C/D)	B)	B)	D)	class 3	consistent with independent data	S. Kunze/T. Suyama	November 2007	Revision 4b (May 19, 2005) Am/9
53544	Ikeda and Amaya(1998)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	C/D)	A)	A)	C/D)	C/D)	C/D)	B)	B)	D)	class 3	consistent with independent data	S. Kunze/T. Suyama	November 2007	Revision 4b (May 19, 2005) Am/9
53545	Ikeda and Amaya(1998)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	C/D)	A)	A)	C/D)	C/D)	C/D)	B)	B)	D)	class 3	consistent with independent data	S. Kunze/T. Suyama	November 2007	Revision 4b (May 19, 2005) Am/9
53546	Ikeda and Amaya(1998)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	B)	A)	A)	C/D)	C/D)	C/D)	B)	B)	D)	class 3	consistent with independent data	S. Kunze/T. Suyama	November 2007	Revision 4b (May 19, 2005) Am/9
53547	Ikeda and Amaya(1998)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	C/D)	A)	A)	C/D)	C/D)	C/D)	B)	B)	D)	class 3	consistent with independent data	S. Kunze/T. Suyama	November 2007	Revision 4b (May 19, 2005) Am/9
53548	Ikeda and Amaya(1998)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	A)	A)	C/D)	C/D)	C/D)	B)	B)	D)	class 3	consistent with independent data	S. Kunze/T. Suyama	November 2007	Revision 4b (May 19, 2005) Am/9
53549	Ikeda and Amaya(1998)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	A)	A)	C/D)	C/D)	C/D)	B)	B)	D)	class 3	consistent with independent data	S. Kunze/T. Suyama	November 2007	Revision 4b (May 19, 2005) Am/9
53550	Ikeda and Amaya(1998)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	A)	A)	C/D)	C/D)	C/D)	B)	B)	D)	class 3	consistent with independent data	S. Kunze/T. Suyama	November 2007	Revision 4b (May 19, 2005) Am/9
62087	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/10
62088	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/10
62089	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/10
62090	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/10
62091	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/10
62092	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/10
56816	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/M. Ochs, BMG	March 2008	Revision 4b (May 19, 2005) Am/11
56817	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/M. Ochs, BMG	March 2008	Revision 4b (May 19, 2005) Am/11
56818	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/M. Ochs, BMG	March 2008	Revision 4b (May 19, 2005) Am/11
56819	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/M. Ochs, BMG	March 2008	Revision 4b (May 19, 2005) Am/11
56820	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/M. Ochs, BMG	March 2008	Revision 4b (May 19, 2005) Am/11
56821	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/M. Ochs, BMG	March 2008	Revision 4b (May 19, 2005) Am/11
56822	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/M. Ochs, BMG	March 2008	Revision 4b (May 19, 2005) Am/11
56823	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/M. Ochs, BMG	March 2008	Revision 4b (May 19, 2005) Am/11
56824	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/M. Ochs, BMG	March 2008	Revision 4b (May 19, 2005) Am/11
56825	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/M. Ochs, BMG	March 2008	Revision 4b (May 19, 2005) Am/11
56826	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/M. Ochs, BMG	March 2008	Revision 4b (May 19, 2005) Am/11
62370	Tanaka and Muraoka(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	A)	A/B)	C/D)	C/D)	B)	D)	D)	class 2	consistent with independent data	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Am/12
62377	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62383	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62407	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	B)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62408	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	B)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62409	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	B)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62410	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	B)	A/B)	A/B)	A/B)	A/B)	B)	unreliable								unreliable	N.E.	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62438	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62439	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62440	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62441	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	B)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62442	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	B)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62469	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	B)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62470	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62471	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62472	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
62473	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	B)	D)	B)	class 2	consistent with independent data	S. Kunze/T. Suyama	March 2008	Revision 4b (May 19, 2005) Am/13
61653	Tanaka and Muraoka(1999)	Yes	Yes	yes (can be used)	class 5	A)	B)	A/B)	A/B)	A/B)	C/D)	A)	A)	B)	C/D)	A/B)	C/D)	C/D)	D)	D)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Am/14
61654	Tanaka and Muraoka(1999)	Yes	Yes	yes (can be used)	class 5	A)	B)	A/B)	A/B)	A/B)	C/D)	A)	A)	B)	C/D)	A/B)	C/D)	C/D)	D)	D)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Am/14
60413	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/15
60414	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/15
60415	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/15
60416	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/15
60417	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/15
60418	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/15
60419	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/15
60420	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/15
60421	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/15
60422	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/15
60423	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/15
61653	Vine et al.(1980a)	No	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Am/16
61654	Vine et al.(1980a)	No	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Am/16
61704	Wolfsberg et al.(1979)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/17
61705	Wolfsberg et al.(1979)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/17
61706	Wolfsberg et al.(1979)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/17
61707	Wolfsberg et al.(1979)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/17
61708	Wolfsberg et al.(1979)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/17
61709	Wolfsberg et al.(1979)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/17
61722	Wolfsberg et al.(1981)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/18
61723	Wolfsberg et al.(1981)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/18
61724	Wolfsberg et al.(1981)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/18
61725	Wolfsberg et al.(1981)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/18
61726	Wolfsberg et al.(1981)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/18
61727	Wolfsberg et al.(1981)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Am/18
62893	Ashida et al.(1999)	Yes	Yes	yes (can be used)	class 5	C/D)	B)	A/B)	C/D)	A/B)	A/B)	B)	A)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 3	N.E.	S. Kunze/M. Ochs, BMG	October 2007	Revision 4b (May 19, 2005) Cs/1
62897	Ashida et al.(1999)	Yes	Yes	yes (can be used)	class 5	C/D)	B)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 3	N.E.	S. Kunze/M. Ochs, BMG	October 2007	Revision 4b (May 19, 2005) Cs/1
44989	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2
44990	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2
44991	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	B)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2
44992	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2
44993	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2
44994	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2
44995	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2
44996	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2
44997	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2
44998	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2
44999	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2
45000	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Cs/2

		I – Completeness of documentation and type of Kd Rating ⇒ I-a: Yes/No, I-b: class 1-6				II – Technical and scientific quality of reported data Checkpoints ⇒ level: A-D (numerical value: 3-0)/unreliable Rating ⇒ class1-6/unreliable																III – Consistency	Operator	Data	Classification Guideline	
Datapoint	Reference	I-a.1	I-a.2	Rating I-a	Rating I-b	II-a solid phase	II-b pH	II-c redox condition	II-d solution composition	II-e temperature	II-f S/W	II-g sorptive value	II-h initial [RN]	II-i phase separation	II-j reaction time	II-k agitation	II-l RN loading	II-m reaction vessels	II-n error estimates	II-o parameter variation	Rating II	comment/rating				
45001	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/2
45002	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/2
45003	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/2
45004	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/2
45005	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/2
45006	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/2
45007	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/2
45008	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 3	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/2
49551	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/3
49552	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/3
49553	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/3
49554	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/3
49555	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/3
49556	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/3
49557	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/3
50937	Erdal et al.(1979d)	Yes	No	no (can not be used)																	unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/4
50942	Erdal et al.(1979d)	Yes	No	no (can not be used)																	unreliable	N.E.	C.Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/4
56189	Maclean et al.(1978)	Yes	Yes	yes (can be used)	class 1	C/D)	D)	A/B)	C/D)	A/B)	A/B)	A)	A)	A)	C/D)	A/B)	C/D)	B)	D)	D)	class 3	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Cs/5
62101	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/6
62102	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/6
62103	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/6
62104	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/6
62105	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/6
62106	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/6
62107	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/6
62108	Meijer et al.(1990)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/6
56393	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	C/D)	D)	D)	class 4	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56394	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	C/D)	A)	C/D)	A/B)	C/D)	C/D)	C/D)	D)	D)	class 4	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56395	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	A)	A)	C/D)	unreliable						unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56396	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	A)	A)	C/D)	unreliable						unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56397	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	A)	A)	C/D)	unreliable						unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56398	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	C/D)	A)	C/D)	unreliable						unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56399	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	A)	A)	C/D)	A/B)	C/D)	C/D)	C/D)	D)	D)	class 4	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56400	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	A)	A)	C/D)	A/B)	C/D)	C/D)	C/D)	D)	D)	class 4	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56401	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	B)	A)	C/D)	unreliable						unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56402	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	B)	A)	C/D)	A/B)	C/D)	C/D)	C/D)	D)	D)	class 4	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56403	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	B)	A)	C/D)	unreliable						unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56404	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	B)	A)	C/D)	unreliable						unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56405	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	B)	A)	C/D)	A/B)	C/D)	C/D)	C/D)	D)	D)	class 4	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56406	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	C/D)	A)	C/D)	unreliable						unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
56407	Meyer et al.(1990)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	C/D)	C/D)	C/D)	A)	C/D)	unreliable						unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/7
57249	Park et al.(1992)	Yes	Yes	yes (can be used)	class 1	B)	B)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	C/D)	A/B)	C/D)	C/D)	D)	C)	class 3	N.E.	S. Kunze/M. Ochs, BMG	October 2007	Revision 4b (May 19, 2005)	Cs/8
57250	Park et al.(1992)	Yes	Yes	yes (can be used)	class 1	B)	B)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	C/D)	A/B)	C/D)	C/D)	D)	C)	class 3	N.E.	S. Kunze/M. Ochs, BMG	October 2007	Revision 4b (May 19, 2005)	Cs/8
57251	Park et al.(1992)	Yes	Yes	yes (can be used)	class 1	B)	B)	A/B)	A/B)	A/B)	A/B)	C/D)	A)	C/D)	C/D)	A/B)	C/D)	C/D)	D)	C)	class 3	N.E.	S. Kunze/M. Ochs, BMG	October 2007	Revision 4b (May 19, 2005)	Cs/8
58575	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58576	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58577	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58578	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58579	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58580	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58581	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58582	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58583	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58584	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58585	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58586	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58587	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58588	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58589	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58590	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58591	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58592	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58593	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58594	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58595	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58596	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58597	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58598	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58599	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58600	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58601	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58602	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58603	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58604	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58605	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58606	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58607	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58608	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58609	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58610	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58611	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58612	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
58613	Rogers and Meijer(1993)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M.Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/9
60430	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60431	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60432	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60433	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60434	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60435	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60436	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60437	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60438	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60439	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60440	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60441	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60442	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60443	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60444	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60445	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60446	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60447	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
60448	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005)	Cs/10
61769	Yamamoto et al.(1989)	No	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Cs/11
45042	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45043	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45044	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45045	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45046	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45047	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45048	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45049	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45050	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45051	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1

				I – Completeness of documentation and type of Kd Rating ⇒ I–a: Yes/No, I–b: class 1–6									II – Technical and scientific quality of reported data Checkpoints ⇒ level: A–D (numerical value: 3–0)/unreliable Rating ⇒ class1–6/unreliable									III – Consistency	Operator	Data	Classification Guideline	
Datapoint	Reference	I–a.1	I–a.2	Rating I–a	Rating I–b	II–a solid phase	II–b pH	II–c redox condition	II–d solution composition	II–e temperature	II–f S/W	II–g sorptive value	II–h initial [RN]	II–i phase separation	II–j reaction time	II–k agitation	II–l RN loading	II–m reaction vessels	II–n error estimates	II–o parameter variation	Rating II	comment/rating				
45052	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45053	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45054	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45055	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45056	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45057	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45058	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45059	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45060	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
45061	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	C/D)	C/D)	A/B)	A/B)	A)	unreliable								unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/1
46828	Baston et al.(1997 and 1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	A)	C/D)	A/B)	C/D)	B)	B)	C)	class 3	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/2
46829	Baston et al.(1997 and 1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	C/D)	A)	C/D)	A/B)	C/D)	B)	B)	C)	class 3	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/2
46830	Baston et al.(1997 and 1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	C/D)	A)	C/D)	A/B)	C/D)	B)	B)	C)	class 3	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/2
46831	Baston et al.(1997 and 1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	C/D)	A)	C/D)	A/B)	C/D)	B)	B)	C)	class 3	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/2
46940	Baston et al.(1997 and 1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	C/D)	A)	C/D)	A/B)	C/D)	B)	B)	C)	class 3	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/2
46941	Baston et al.(1997 and 1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	C/D)	A)	C/D)	A/B)	C/D)	B)	B)	C)	class 3	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/2
49763	Daniels et al.(1982)	No	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/3
49764	Daniels et al.(1982)	No	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/3
49765	Daniels et al.(1982)	No	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/3
49766	Daniels et al.(1982)	No	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/3
49767	Daniels et al.(1982)	No	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/3
49768	Daniels et al.(1982)	No	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/3
49769	Daniels et al.(1982)	No	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/3
56839	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/4
56840	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/4
56841	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/4
56842	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/4
56843	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/4
56844	Nakayama et al.(1986)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/4
58614	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58615	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58616	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58617	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58618	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58619	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58620	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58621	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58622	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58623	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58624	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58625	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58626	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58627	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58628	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58629	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58630	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58631	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58632	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58633	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58634	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58635	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58636	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58637	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58638	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58639	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58640	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58641	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58642	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58643	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58644	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58645	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58646	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58647	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
58648	Rogers and Meijer(1993)	Yes	Yes	yes (can be used)	class 1	C/D)	B)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/5
62315	Tanaka and Muraoka(1999)	Yes	Yes	yes (can be used)	class 5	A)	B)	A/B)	A/B)	A/B)	C/D)	A)	A)	B)	C/D)	A/B)	C/D)	C/D)	D)	D)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/6
62374	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62380	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62390	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	B)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62391	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	B)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62392	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62393	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62394	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62422	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62423	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62424	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	B)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62425	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	B)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62426	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	B)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62453	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62454	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62455	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62456	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62457	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
62458	Tanaka et al.(1998)	Yes	Yes	yes (can be used)	class 5	C/D)	A)	A/B)	A/B)	A/B)	A/B)	B)	A)	C/D)	A/B)	A/B)	C/D)	B)	D)	B)	class 2	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/7
60456	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60457	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60458	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60459	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60460	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60461	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60462	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60463	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60464	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60465	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60466	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60467	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60468	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60469	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60470	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60471	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60472	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60473	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60474	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60475	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60476	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60477	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60478	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60479	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60480	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60481	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60482	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60483	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60484	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60485	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60486	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8
60487	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005)	Np/8

		I – Completeness of documentation and type of Kd Rating ⇒ I-a: Yes/No, I-b: class 1-6				II – Technical and scientific quality of reported data Checkpoints ⇒ level: A-D (numerical value: 3-0)/unreliable Rating ⇒ class1-6/unreliable																III – Consistency	Operator	Data	Classification Guideline
Datapoint	Reference	I-a.1	I-a.2	Rating I-a	Rating I-b	II-a solid phase	II-b pH	II-c redox condition	II-d solution composition	II-e temperature	II-f S/W	II-g sorptive value	II-h initial [RN]	II-i phase separation	II-j reaction time	II-k agitation	II-l RN loading	II-m reaction vessels	II-n error estimates	II-o parameter variation	Rating II	comment/rating			
45192	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	unreliable													unreliable	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45193	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45194	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	unreliable													unreliable	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45195	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	unreliable													unreliable	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45196	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	unreliable													unreliable	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45197	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	unreliable													unreliable	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45198	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	unreliable													unreliable	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45199	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45200	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45201	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45202	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	unreliable													unreliable	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45203	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45204	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45205	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45206	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45207	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45208	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	A/B)	C/D)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	A)	B)	D)	C)	class 2	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45209	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	unreliable													unreliable	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
45210	Barney(1982)	Yes	Yes	yes (can be used)	class 1	B)	A)	unreliable													unreliable	N.E.	C. Ganter/T. Suyama	March 2010	Revision 4b (May 19, 2005) Se/1
49374	Conca and Triay(1996)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Se/2
49375	Conca and Triay(1996)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Se/2
49376	Conca and Triay(1996)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Se/2
49826	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/3
49827	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/3
49828	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/3
49829	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/3
49830	Daniels et al.(1982)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/ M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/3
59232	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59233	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	C/D)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59234	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59235	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59236	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59237	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59238	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59239	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59240	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59241	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59242	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59243	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59244	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59245	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59246	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59247	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59248	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	B)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59249	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	B)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59250	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	B)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59251	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	B)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59252	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	B)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59253	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	B)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59254	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
59255	Shibutani et al.(1994)	Yes	Yes	yes (can be used)	class 2	C/D)	A)	C/D)	A/B)	A/B)	A/B)	A)	C/D)	B)	C/D)	C/D)	C/D)	C/D)	D)	C)	class 4	N.E.	S. Kunze/T. Suyama	December 2007	Revision 4b (May 19, 2005) Se/4
60506	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60507	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60508	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60509	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60510	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60511	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60512	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60513	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60514	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60515	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60516	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60517	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60518	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60519	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60520	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60521	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60522	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60523	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60524	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60525	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
60526	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Se/5
46560	Baston et al.(1994)	Yes	Yes	yes (can be used)	class 5	B)	A)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Th/1
46561	Baston et al.(1994)	Yes	Yes	yes (can be used)	class 5	B)	A)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Th/1
46562	Baston et al.(1994)	Yes	Yes	yes (can be used)	class 5	B)	A)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Th/1
46563	Baston et al.(1994)	Yes	Yes	yes (can be used)	class 5	B)	A)	A/B)	unreliable												unreliable	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Th/1
65713	Ishii et al.(2001)	Yes	Yes	yes (can be used)	class 1	A)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	B)	A)	A)	B)	class 1	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Th/2
65714	Ishii et al.(2001)	Yes	Yes	yes (can be used)	class 1	A)	A)	A/B)	A/B)	A/B)	A/B)	A)	A)	B)	C/D)	A/B)	B)	A)	A)	B)	class 1	N.E.	T. Suyama/Y.Tachi, JAEA	August 2010	Revision 4b (May 19, 2005) Th/2
60554	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Th/3
60555	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Th/3
60556	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Th/3
60557	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Th/3
60558	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Th/3
60559	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Th/3
60560	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Th/3
60561	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Th/3
60562	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Th/3
60563	Thomas(1987)	Yes	No	no (can not be used)																	unreliable	N.E.	C. Ganter/M. Ochs, BMG	March 2010	Revision 4b (May 19, 2005) Th/3
61621	Ueta et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/4
61622	Ueta et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/4
61623	Ueta et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/4
61624	Ueta et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/4
61625	Ueta et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/4
61626	Ueta et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/4
61627	Ueta et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/4
61628	Ueta et al.(1998)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	C/D)	A/B)	A/B)	C/D)	unreliable								unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/4
61629	Ueta et al.(1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/5
61630	Ueta et al.(1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/5
61631	Ueta et al.(1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/5
61632	Ueta et al.(1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	unreliable												unreliable	N.E.	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/5
61633	Ueta et al.(1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	B)	A)	C/D)	A/B)	C/D)	C/D)	D)	D)	class 2	approximately consistent with independent data	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/5
61634	Ueta et al.(1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	B)	A)	C/D)	A/B)	C/D)	C/D)	A)	D)	class 2	approximately consistent with independent data	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/5
61635	Ueta et al.(1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	B)	A)	C/D)	A/B)	C/D)	C/D)	A)	D)	class 2	approximately consistent with independent data	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/5
61636	Ueta et al.(1999)	Yes	Yes	yes (can be used)	class 1	C/D)	A)	A/B)	A/B)	A/B)	A/B)	A)	B)	A)	C/D)	A/B)	C/D)	C/D)	D)	D)	class 2	approximately consistent with independent data	S. Kunze/T. Suyama	January 2008	Revision 4b (May 19, 2005) Th/5

国際単位系（SI）

表１．SI 基本単位

基本量	SI 基本単位	
	名称	記号
長さ	メートル	m
質量	キログラム	kg
時間	秒	s
電流	アンペア	A
熱力学温度	ケルビン	K
物質量	モル	mol
光度	カンデラ	cd

表２．基本単位を用いて表されるSI組立単位の例

組立量	SI 基本単位	
	名称	記号
面積	平方メートル	m^2
体積	立法メートル	m^3
速さ，速度	メートル毎秒	m/s
加速度	メートル毎秒毎秒	m/s^2
波数	毎メートル	m^{-1}
密度，質量密度	キログラム毎立方メートル	kg/m^3
面積密度	キログラム毎平方メートル	kg/m^2
比体積	立方メートル毎キログラム	m^3/kg
電流密度	アンペア毎平方メートル	A/m^2
磁界の強さ	アンペア毎メートル	A/m
量濃度(a)，濃度	モル毎立方メートル	mol/m^3
質量濃度	キログラム毎立法メートル	kg/m^3
輝度	カンデラ毎平方メートル	cd/m^2
屈折率(b)	（数字の）　1	1
比透磁率(b)	（数字の）　1	1

(a) 量濃度（amount concentration）は臨床化学の分野では物質濃度（substance concentration）ともよばれる。

(b) これらは無次元量あるいは次元１をもつ量であるが、そのことを表す単位記号である数字の１は通常は表記しない。

表３．固有の名称と記号で表されるSI組立単位

組立量	SI 組立単位			
	名称	記号	他のSI単位による表し方	SI基本単位による表し方
平面角	ラジアン(b)	rad	1(b)	m/m
立体角	ステラジアン(b)	sr(c)	1(b)	$m^{2/}m^2$
周波数	ヘルツ(d)	Hz		s^{-1}
力	ニュートン	N		$m\ kg\ s^{-2}$
圧力，応力	パスカル	Pa	N/m^2	$m^{-1}\ kg\ s^{-2}$
エネルギー，仕事，熱量	ジュール	J	N m	$m^2\ kg\ s^{-2}$
仕事率，工率，放射束	ワット	W	J/s	$m^2\ kg\ s^{-3}$
電荷，電気量	クーロン	C		s A
電位差（電圧），起電力	ボルト	V	W/A	$m^2\ kg\ s^{-3}\ A^{-1}$
静電容量	ファラド	F	C/V	$m^{-2}\ kg^{-1}\ s^4\ A^2$
電気抵抗	オーム	Ω	V/A	$m^2\ kg\ s^{-3}\ A^{-2}$
コンダクタンス	ジーメンス	S	A/V	$m^{-2}\ kg^{-1}\ s^3\ A^2$
磁束	ウエーバ	Wb	Vs	$m^2\ kg\ s^{-2}\ A^{-1}$
磁束密度	テスラ	T	Wb/m^2	$kg\ s^{-2}\ A^{-1}$
インダクタンス	ヘンリー	H	Wb/A	$m^2\ kg\ s^{-2}\ A^{-2}$
セルシウス温度	セルシウス度(e)	℃		K
光束	ルーメン	lm	cd sr(c)	cd
照度	ルクス	lx	lm/m^2	$m^{-2}\ cd$
放射性核種の放射能(f)	ベクレル(d)	Bq		s^{-1}
吸収線量, 比エネルギー分与, カーマ	グレイ	Gy	J/kg	$m^2\ s^{-2}$
線量当量, 周辺線量当量, 方向性線量当量, 個人線量当量	シーベルト(g)	Sv	J/kg	$m^2\ s^{-2}$
酸素活性	カタール	kat		$s^{-1}\ mol$

(a)SI接頭語は固有の名称と記号を持つ組立単位と組み合わせても使用できる。しかし接頭語を付した単位はもはやコヒーレントではない。

(b)ラジアンとステラジアンは数字の１に対する単位の特別な名称で、量についての情報をつたえるために使われる。実際には、使用する時には記号rad及びsrが用いられるが、習慣として組立単位としての記号である数字の１は明示されない。

(c)測光学ではステラジアンという名称と記号srを単位の表し方の中に、そのまま維持している。

(d)ヘルツは周期現象についてのみ、ベクレルは放射性核種の統計的過程についてのみ使用される。

(e)セルシウス度はケルビンの特別な名称で、セルシウス温度を表すために使用される。セルシウス度とケルビンの単位の大きさは同一である。したがって、温度差や温度間隔を表す数値はどちらの単位で表しても同じである。

(f)放射性核種の放射能（activity referred to a radionuclide）は、しばしば誤った用語で"radioactivity"と記される。

(g)単位シーベルト（PV,2002,70,205）についてはCIPM勧告2（CI-2002）を参照。

表４．単位の中に固有の名称と記号を含むSI組立単位の例

組立量	SI 組立単位		
	名称	記号	SI 基本単位による表し方
粘度	パスカル秒	Pa s	$m^{-1}\ kg\ s^{-1}$
力のモーメント	ニュートンメートル	N m	$m^2\ kg\ s^{-2}$
表面張力	ニュートン毎メートル	N/m	$kg\ s^{-2}$
角速度	ラジアン毎秒	rad/s	$m\ m^{-1}\ s^{-1}=s^{-1}$
角加速度	ラジアン毎秒毎秒	rad/s^2	$m\ m^{-1}\ s^{-2}=s^{-2}$
熱流密度，放射照度	ワット毎平方メートル	W/m^2	$kg\ s^{-3}$
熱容量，エントロピー	ジュール毎ケルビン	J/K	$m^2\ kg\ s^{-2}\ K^{-1}$
比熱容量，比エントロピー	ジュール毎キログラム毎ケルビン	J/(kg K)	$m^2\ s^{-2}\ K^{-1}$
比エネルギー	ジュール毎キログラム	J/kg	$m^2\ s^{-2}$
熱伝導率	ワット毎メートル毎ケルビン	W/(m K)	$m\ kg\ s^{-3}\ K^{-1}$
体積エネルギー	ジュール毎立方メートル	J/m^3	$m^{-1}\ kg\ s^{-2}$
電界の強さ	ボルト毎メートル	V/m	$m\ kg\ s^{-3}\ A^{-1}$
電荷密度	クーロン毎立方メートル	C/m^3	$m^{-3}\ sA$
表面電荷	クーロン毎平方メートル	C/m^2	$m^{-2}\ sA$
電束密度，電気変位	クーロン毎平方メートル	C/m^2	$m^{-2}\ sA$
誘電率	ファラド毎メートル	F/m	$m^{-3}\ kg^{-1}\ s^4\ A^2$
透磁率	ヘンリー毎メートル	H/m	$m\ kg\ s^{-2}\ A^{-2}$
モルエネルギー	ジュール毎モル	J/mol	$m^2\ kg\ s^{-2}\ mol^{-1}$
モルエントロピー, モル熱容量	ジュール毎モル毎ケルビン	J/(mol K)	$m^2\ kg\ s^{-2}\ K^{-1}\ mol^{-1}$
照射線量（Ｘ線及びγ線）	クーロン毎キログラム	C/kg	$kg^{-1}\ sA$
吸収線量率	グレイ毎秒	Gy/s	$m^2\ s^{-3}$
放射強度	ワット毎ステラジアン	W/sr	$m^4\ m^{-2}\ kg\ s^{-3}=m^2\ kg\ s^{-3}$
放射輝度	ワット毎平方メートル毎ステラジアン	$W/(m^2\ sr)$	$m^2\ m^{-2}\ kg\ s^{-3}=kg\ s^{-3}$
酵素活性濃度	カタール毎立方メートル	kat/m^3	$m^{-3}\ s^{-1}\ mol$

表５．SI 接頭語

乗数	接頭語	記号	乗数	接頭語	記号
10^{24}	ヨタ	Y	10^{-1}	デシ	d
10^{21}	ゼタ	Z	10^{-2}	センチ	c
10^{18}	エクサ	E	10^{-3}	ミリ	m
10^{15}	ペタ	P	10^{-6}	マイクロ	µ
10^{12}	テラ	T	10^{-9}	ナノ	n
10^9	ギガ	G	10^{-12}	ピコ	p
10^6	メガ	M	10^{-15}	フェムト	f
10^3	キロ	k	10^{-18}	アト	a
10^2	ヘクト	h	10^{-21}	ゼプト	z
10^1	デカ	da	10^{-24}	ヨクト	y

表６．SIに属さないが、SIと併用される単位

名称	記号	SI 単位による値
分	min	1 min=60s
時	h	1h =60 min=3600 s
日	d	1 d=24 h=86 400 s
度	°	1°=(π/180) rad
分	’	1’=(1/60)°=(π/10800) rad
秒	”	1”=(1/60)’=(π/648000) rad
ヘクタール	ha	$1ha=1hm^2=10^4m^2$
リットル	L，l	$1L=1l=1dm^3=10^3cm^3=10^{-3}m^3$
トン	t	$1t=10^3\ kg$

表７．SIに属さないが、SIと併用される単位で、SI単位で表される数値が実験的に得られるもの

名称	記号	SI 単位で表される数値
電子ボルト	eV	$1eV=1.602\ 176\ 53(14)\times10^{-19}J$
ダルトン	Da	$1Da=1.660\ 538\ 86(28)\times10^{-27}kg$
統一原子質量単位	u	1u=1 Da
天文単位	ua	$1ua=1.495\ 978\ 706\ 91(6)\times10^{11}m$

表８．SIに属さないが、SIと併用されるその他の単位

名称	記号	SI 単位で表される数値
バール	bar	$1\ bar=0.1MPa=100kPa=10^5Pa$
水銀柱ミリメートル	mmHg	1mmHg=133.322Pa
オングストローム	Å	$1\ Å=0.1nm=100pm=10^{-10}m$
海里	M	1 M=1852m
バーン	b	$1\ b=100fm^2=(10^{-12}cm)2=10^{-28}m^2$
ノット	kn	1 kn=(1852/3600)m/s
ネーパ	Np	SI単位との数値的な関係は、対数量の定義に依存。
ベル	B	
デジベル	dB	

表９．固有の名称をもつCGS組立単位

名称	記号	SI 単位で表される数値
エルグ	erg	$1\ erg=10^{-7}\ J$
ダイン	dyn	$1\ dyn=10^{-5}N$
ポアズ	P	$1\ P=1\ dyn\ s\ cm^{-2}=0.1Pa\ s$
ストークス	St	$1\ St\ =1cm^2\ s^{-1}=10^{-4}m^2\ s^{-1}$
スチルブ	sb	$1\ sb\ =1cd\ cm^{-2}=10^4cd\ m^{-2}$
フォト	ph	$1\ ph=1cd\ sr\ cm^{-2}\ 10^4lx$
ガル	Gal	$1\ Gal\ =1cm\ s^{-2}=10^{-2}ms^{-2}$
マクスウェル	Mx	$1\ Mx = 1G\ cm^2=10^{-8}Wb$
ガウス	G	$1\ G\ =1Mx\ cm^{-2}\ =10^{-4}T$
エルステッド(c)	Oe	$1\ Oe \triangleq (10^3/4\pi)A\ m^{-1}$

(c) ３元系のCGS単位系とSIでは直接比較できないため、等号「 ≙ 」は対応関係を示すものである。

表10．SIに属さないその他の単位の例

名称	記号	SI 単位で表される数値
キュリー	Ci	$1\ Ci=3.7\times10^{10}Bq$
レントゲン	R	$1\ R = 2.58\times10^{-4}C/kg$
ラド	rad	$1\ rad=1cGy=10^{-2}Gy$
レム	rem	$1\ rem=1\ cSv=10^{-2}Sv$
ガンマ	γ	1γ=1 nT=10-9T
フェルミ		1フェルミ=1 fm=10-15m
メートル系カラット		1メートル系カラット = 200 mg = 2×10-4kg
トル	Torr	1 Torr = (101 325/760) Pa
標準大気圧	atm	1 atm = 101 325 Pa
カロリー	cal	1cal=4.1858J（「15℃」カロリー），4.1868J（「IT」カロリー）4.184J（「熱化学」カロリー）
ミクロン	µ	$1\ \mu\ =1\mu m=10^{-6}m$

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