

²⁶Al-¹⁰Be exposure age/erosion rate calculators: table of Be and Al isotope ratio standardizations

This document contains Tables 2 and 3 of the documentation for the update to version 2.2. This update was effective March 19, 2009.

These tables have been further updated. The latest update was February 25, 2016.

Questions on this document: Greg Balco, balcs@u.washington.edu

Table 2: Defined standardizations for ¹⁰Be measurements. Conversion factors (CF) are the factors by which the calculator multiplies a nuclide concentration measured using a given standardization to make it consistent with the 07KNSTD standardization. Please note that the user should not correct their measurements using this factor before data entry – the point is that the user describes how their data were collected, and the normalization is carried out internally.

Code	Description	CF
Be standardizations		
07KNSTD	Any of a dilution series derived from the so-called "ICN solution" by K. Nishiizumi and described in Nishiizumi et al, 2007 (NIM-B v. 258, p. 403), with the revised nominal isotope ratios listed in that publication and in the printed description of the standards available from K. Nishiizumi and dated May 29, 2007. Measurements made at LLNL-CAMS with these standards and nominal isotope ratios will list '07KNSTDx,' where 'X' is a number related to the isotope ratio of the particular dilution. Be-10 measurements made at PRIME Lab after November 14, 2007 were referenced to this standardization. This is the standardization on which the internal constants and production rates in the online exposure age calculator are based, so measurements made using any other standardization will be internally converted to be consistent with this one.	1.000
KNSTD	This refers to the same standard material as above – the dilution series derived from the ICN solution by K. Nishiizumi – but with a different nominal isotope ratio that was assumed for this standard material before the 2007 revision. Measurements made at LLNL-CAMS with this standardization will list 'KNSTDx' as the name of the standard. Measurements made at PRIME Lab between January 12, 2005 and November 14, 2007 use this standardization.	0.9042
NIST_Certified	This refers to a standard material produced by the National Institute of Standards and Technology (NIST), referred to as SRM4325, with the nominal isotope ratio stated on the certificate for this material (2.68×10^{-11} for the solution as supplied by NIST). Measurements made at PRIME Lab prior to January 12, 2005 used this standardization.	1.0425
NIST_30000	The NIST SRM4325 standard material, but with an assumed isotope ratio of 3.0×10^{-11} rather than the NIST certified value.	0.9313
NIST_30200	NIST SRM4325 with an assumed isotope ratio of 3.02×10^{-11} .	0.9251
NIST_30300	NIST SRM4325 with an assumed isotope ratio of 3.03×10^{-11} .	0.9221
NIST_30600	NIST SRM4325 with an assumed isotope ratio of 3.06×10^{-11} .	0.9130
NIST_27900	NIST SRM4325 with an assumed isotope ratio of 2.79×10^{-11} . This standardization is equivalent to 07KNSTD within rounding error, so users can enter either one.	1.000

Table 2, continued.

Code	Description	CF
Be standardizations		
BEST433	ETH-Zurich standard material “BEST433” with an assumed isotope ratio of 93.1×10^{-12} . Reflects intercomparison by Kubik and Christl (2010). This standardization was in use at ETH prior to April 1, 2010.	0.9124
S555	ETH-Zurich standard material “S555” with an assumed isotope ratio of 95.5×10^{-12} . Reflects intercomparison by Kubik and Christl (2010). This standardization was in use at ETH prior to April 1, 2010.	0.9124
S2007	ETH-Zurich standard material “S2007” with an assumed isotope ratio of 30.8×10^{-12} . Reflects intercomparison by Kubik and Christl (2010). This standardization was in use at ETH prior to April 1, 2010.	0.9124
BEST433N	ETH-Zurich standard material originally called “BEST433” with a revised isotope ratio of 83.3×10^{-12} . This standardization is equivalent to 07KNSTD, so users can enter either one. Reflects intercomparison by Kubik and Christl (2010). This standardization was adopted at ETH on April 1, 2010.	1.000
S555N	ETH-Zurich standard material originally called “S555” with a revised isotope ratio of 87.1×10^{-12} . This standardization is equivalent to 07KNSTD, so users can enter either one. Reflects intercomparison by Kubik and Christl (2010). This standardization was adopted at ETH on April 1, 2010.	1.000
S2007N	ETH-Zurich standard material originally called “S2007” with a revised isotope ratio of 28.1×10^{-12} . This standardization is equivalent to 07KNSTD, so users can enter either one. Reflects intercomparison by Kubik and Christl (2010). This standardization was adopted at ETH on April 1, 2010.	1.000
STD11	ASTER standard called “STD-11” with an assumed isotope ratio of 1.191×10^{-11} . This standard was calibrated by reference to NIST.27900, which is equivalent to 07KNSTD at rounding error, so all three of these should be equivalent.	1.000
SMDBe12	HZDR/DREAMS internal standard ‘SMD-Be-12’ with published nominal value of $1.704\text{e-}12$. See Akhmadaliev et al. 2013. This standardization should be equivalent to 07KNSTD.	1.000
LLNL31000	Internal LLNL-CAMS standardization. Identified by this name on CAMS data reports.	0.8761
LLNL10000	Internal LLNL-CAMS standardization. Identified by this name on CAMS data reports.	0.9042
LLNL3000	Internal LLNL-CAMS standardization. Identified by this name on CAMS data reports.	0.8644
LLNL1000	Internal LLNL-CAMS standardization. Identified by this name on CAMS data reports.	0.9313
LLNL300	Internal LLNL-CAMS standardization. Identified by this name on CAMS data reports.	0.8562

Table 3: Defined standardizations for ^{26}Al measurements. Conversion factors (CF) are the factors by which the calculator multiplies a nuclide concentration measured using a given standardization to make it consistent with the KNSTD standardization. Please note that the user should not correct their measurements using this factor before data entry – the point is that the user describes how their data were collected, and the normalization is carried out internally.

Code	Description	CF
Al standardizations		
KNSTD	Any of a dilution series described in Nishiizumi, 2004 (NIM-B, v. 223-224, p. 388), with the nominal isotope ratios described in this publication. Measurements made at LLNL-CAMS with this standardization will list 'KNSTD $\times$,' where 'X' is a number related to the isotope ratio of the particular dilution. This is the standardization on which the internal constants and production rates in the online exposure age calculator are based.	1.000
ZAL94	ETH-Zurich standard material "ZAL94" with an assumed isotope ratio of 526×10^{12} . The University of Cologne "AL09" standard material with an assumed isotope ratio of 1190×10^{12} is also consistent with this standardization. This standardization was in use at ETH prior to April 1, 2010. From the intercomparison by Kubik and Christl (2010).	0.9134
ZAL94N	ETH-Zurich standard material originally called "ZAL94" with a revised isotope ratio of 490×10^{12} . This standardization is equivalent to KNSTD, so users can enter either one. This standardization was adopted at ETH on April 1, 2010. From the intercomparison by Kubik and Christl (2010).	1.000
SMAL11	Internal standard used at ASTER, named "SM-Al-11" and with a defined $^{26}\text{Al}/^{27}\text{Al}$ ratio of $7.401 \pm 0.064 \times 10^{-12}$. This standard is part of a dilution series that also includes standard materials called "SM-Al-10," "SM-Al-12," and "SM-Al-13," with defined isotope ratios of 9.352×10^{-11} , 7.21×10^{-13} , and 7.30×10^{-14} , respectively. See Arnold et al. (NIMB, 2010) for details.	1.021
Z92-0222	Al standard originally prepared at Purdue and used at several other labs with a defined isotope ratio of 4.11×10^{-11} . This standardization is equivalent to KNSTD, so users can enter either one.	1.000
SMDA111	HZDR/DREAMS internal standard 'SMD-Al-11' with published nominal value of 9.66e-12. See Rugel et al., 2016. Internal cross-calibration with KNSTD results in a conversion factor of 1.018. Note that the name 'SMDA111' has one 'l' and two '1's.	1.018