

## BUSINESS MEETING

### INTERNATIONAL AGREEMENTS AND THE USE OF THE NEW OXALIC ACID STANDARD

MINZE STUIVER

Quaternary Research Center and Department of Geological Sciences  
Seattle, Washington 98195

The international radiocarbon community met on June 25, 1982. Two reports were presented, and several measures related to radiocarbon dating discussed and adopted.

P E Damon reported on the activities of the International Calibration Committee. The efforts of the committee were directed towards the development of the calibration tables comprising the data generated by several laboratories in the 20 years following the pioneering work of de Vries. These tables were published by Klein et al (1982). The International Calibration Committee was discharged with thanks for their useful work and a smaller committee with W G Mook as chairman was reconstituted for the 1982-1985 interval. One of the tasks of the committee is to evaluate, prior to the 1985 International Radiocarbon Conference, the available high-precision data and combine these data in a "second generation" calibration curve. Sentiment was expressed at the meeting that particular attention should be given to the dendrochronologic aspects, and to the format of reporting of the calibration data.

W B Mann of the National Bureau of Standards reported the results of the international cooperative effort of calibrating the new oxalic acid standard (NOX) relative to the old oxalic standard (OX). The report, given in Chapter V, yields a weighted average of the weighted individual results:

$$\text{NOX/OX} = 1.2933 \pm 0.0004.$$

The reported  $\delta^{13}\text{C}_{\text{PDB}}$  values average -17.8‰ for NOX and -19.3‰ for OX (Mann, 1983). The following normalizations apply (Stuiver and Robinson, 1974):

$$\text{NOX}(-25) = \text{NOX} (-17.8) 0.975^2 / (1 + \delta^{13}\text{C}_{\text{nox}}/1000)^2 \quad (1)$$

and

$$\text{OX}(-19) = \text{OX} (-19.3) 0.981^2 / (1 + \delta^{13}\text{C}_{\text{ox}}/1000)^2 \quad (2)$$

where  $\delta^{13}\text{C}$  values are measured relative to PDB.

The  $^{14}\text{C}$  activity of the international standard for radiocarbon dating is equal to 95% of the OX(-19) activity, or 0.95 OX(-19). This same activity has to equal X NOX (-25), where X is the factor to be calculated from the calibration movements.

Thus:

$$\begin{aligned} 0.95 \text{ OX}(-19) &= X \text{ NOX} (-25), \text{ or} \\ X &= 0.95 \text{ OX}(-19) / \text{NOX}(-25) \end{aligned} \quad (3)$$

Substitution of (1) and (2) in (3) results in

$$X=0.95 \frac{0.981^2(1 + \delta^{13}\text{C}_{\text{nox}}/1000)^2 \text{ OX} (-19.3)}{0.975^2(1 + \delta^{13}\text{C}_{\text{ox}}/1000)^2 \text{ NOX} (-17.8)} \quad (4)$$

The X value does not change materially with the absolute value of  $\delta^{13}\text{C}_{\text{ox}}$  and  $\delta^{13}\text{C}_{\text{nox}}$ , as long as the 1.5%  $\delta$  difference between both standards is constant. This difference in isotope ratio has been measured with excellent reproducibility (Mann, 1983).

Substitution of the measured values in (4) yields

$$X = 0.7459$$

Thus, 0.7459 times the new oxalic acid activity (when normalized on  $\delta^{13}\text{C}_{\text{PDB}} = -25\%$ ) equals 0.95 times the old oxalic acid activity (normalized on a  $\delta^{13}\text{C}_{\text{PDB}} = -19\%$ ).

The X value reported here is 0.0002 units larger than the previously reported (Stuiver, 1980) value. The 1980 report also discusses "X" values for NOX activities normalized on a  $\delta^{13}\text{C}$  value of either -17, or -19%. These "X" values also should be increased by 0.0002 units.

The following decisions were made by majority vote:

1) The uncertainty in the  $^{14}\text{C}$  date or  $\Delta^{14}\text{C}$  value should be reported as one standard deviation, with a clear definition of the factors that are included in such a standard error.

2) The use of the Libby 5568-year half-life for reporting  $^{14}\text{C}$  ages by all laboratories was re-affirmed. A special invitation was made to the Chinese laboratories to use the Libby half-life.

3) The weighted averages of the weighted individual results of the international NOX calibration should be used for the calculation of the X factor. The NOX standard is to be normalized on a  $\delta^{13}\text{C}_{\text{PDB}} = -25\%$ . The latter measure re-affirms the adoption of the -25% value of NOX at the Tenth International Radiocarbon Conference (Stuiver, 1980). These decisions lead to  $X = 0.7459$ .

4) A three-year rotational schedule (with the possibility of re-appointment) applies to the term of appointment of

members of the International Calibration Committee.

5) A request was made to Reidar Nydal to host the 12th International Radiocarbon Conference in Trondheim, Norway, in the summer of 1985.

#### REFERENCES

- Klein, Jeffrey, Lerman, J C, Damon, P E, and Ralph, E K, 1982, Calibration of radiocarbon dates: tables based on the consensus data of the Workshop on Calibrating the Radiocarbon Time Scale: *Radiocarbon*, v 24, p 103-150.
- Mann, W B, An international reference material for radiocarbon dating, in Stuiver, M and Kra, R S, eds, *Internatl <sup>14</sup>C conf*, 11th, *Proc: Radiocarbon*, v 25.
- Stuiver, Minze, 1980, Workshop on <sup>14</sup>C data reporting, in Stuiver, M and Kra, R S, eds, *Internatl <sup>14</sup>C conf*, 10th, *Proc: Radiocarbon*, v 22, no. 3, p 964-966.
- Stuiver, Minze and Robinson, S W, 1974, University of Washington Geosecs North Atlantic carbon - 14 results: *Earth Planetary Letters*, v 23, p 87-90.