National Bureau of Standards
Certificate
Standard Reference Material 4260
Photon-Emission-Rate Standard Sample

Iron-55

This Standard Reference Material consists of iron-55 quantita-
tively deposited as the chloride, on the lacquered surface of
a 0.01-cm thick, stainless steel disk, 1.7 cm in diameter.
The deposit is covered with another layer of lacquer approxi-
mately 0.002 g/cm^2 thick, and the stainless steel disk is
cemented to a monel disk 2.54 cm in diameter.

Using a detector located in a direction normal to the plane
of the source mount, the number of manganese K-x-rays emit-
ted per second per steradian, on March 25, 1974, was

$$*\qquad \pm3.0\%*.$$

This Standard Reference Material was standardized by comparison
of its emission rate with that of a working standard which had
been calibrated by means of high-pressure proportional counting.

The uncertainty in the emission rate, 3.0 percent, is the
linear sum of 1.5 percent, which is the limit of the random
error associated with the emission-rate comparison at the
99-percent confidence limit (2.9 S_m, where S_m is the stand-
ard error computed from 18 measurements), and the total
error, 1.5 percent, in the working standard.

An error of the order of 0.1 percent can be introduced if the
detector is located at an angle 20 degrees away from the normal
to the source mount, due to absorption by the lacquer.

The material from which this Standard Reference Material
was prepared was examined for photon-emitting impurities
using a pure germanium detector and none was found.

A half life obtained from the literature of 2.7 years[1]
is recommended.

This standard was prepared and calibrated in the Center for
Radiation Research, Radioactivity Section, W. B. Mann, Chief.

Washington, D.C. 20234   J. Paul Cali, Chief
August, 1974   Office of Standard Reference Materials

SRM-4260-   (over)

Information on the Use of SRM 4260
Iron-55 Point Sources

Decay Scheme

$$^{55}_{26}\text{Fe}_{29}$$

EC (100%)

$$^{55}_{25}\text{Mn}_{30}$$
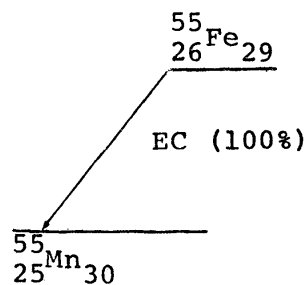
Energies and Abundance [2,3]

Transition,	Energy (keV)	Abundance
K_{α_2},	5.888	0.0762
K_{α_1},	5.899	0.1506
$K_{\beta_{1,3}}$,	6.490	0.0303
K_{β_5},	6.535	--

Additional Information

The calibration of this standard is given in terms of N_O, the number of manganese K-x-rays per second per steradian emitted in the direction perpendicular to the surface of the source. For most counting geometries, the detector efficiency, ε, can be calculated from the observed count rate, N, by means of the following formula:

$$\varepsilon = \frac{N}{4\pi N_O}$$

It is recommended that the source be placed so that the outside edges of the detector subtend angles, relative to the perpendicular from the surface of the source, of less than 20°. This precaution will insure that errors, caused by increased absorption of K-x-rays emitted away from the perpendicular, by the film of lacquer, are less than 0.1%.

For detectors of larger solid angle, such as 2π, corrections can be calculated using the total scatter cross section for the lacquer, 10 cm^2/g.

[1] M. J. Martin and P. H. Blichert-Toft, Nuclear Data Tables, 8, Numbers 1-2, Section A, October 1970.

[2,3] Calculated from data in the following references:

2. P. V. Rao, M. H. Chess, and B. Crasemann, Phys. Rev., A5 997 (1972).
3. G. C. Nelson, B. G. Saunders and S. I. Salem, Atomic Data, 1, No. 4, November, 1970.