

# National Bureau of Standards

## Certificate

### Standard Reference Material 4209-C

#### Radioactivity Standard

Radionuclide	Yttrium-88
Source identification	SRM 4209-C-
Source description	Point source (1)*
Activity	$s^{-1}$ (Bq) (2)
Reference time	1200 EST September 1, 1980
Random uncertainty	0.08 percent (3)
Systematic uncertainty	0.62 percent (4)
Total uncertainty (Random plus systematic)	0.70 percent
Photon-emitting impurities	None detected (5)
Half life	$106.64 \pm 0.08$ days (6)
Measuring instrument	NBS pressurized $4\pi$ $\gamma$ ionization chamber calibrated by $4\pi(e+x,\gamma)$ anticoincidence efficiency-extrapolation technique

This Standard Reference Material was prepared in the Center for Radiation Research,  
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Washington, D.C. 20234  
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### FOOTNOTES

- (1) The point source support is a 5.4-cm-diameter x 1-mm-thick aluminum annulus supporting a 0.006-cm-thick layer of polyester tape. The active source is a 3-mm-diameter dried deposit of yttrium-88 as the chloride, covered with another layer of the same tape.
- (2) The gamma-ray-emission rates may be computed using the following  $P_\gamma$  values:
- |            |  |
|------------|--|
| 898.0 keV  | $P_\gamma = 0.943 \pm 0.004$ (NBS measurement)                     |
| 1836.0 keV | $P_\gamma = 0.9935 \pm 0.0003$ (NCRP Report No. 58, 1978, p. 357.) |
- (3) Half the 99-percent confidence interval of the mean (3.499 times the standard error computed from 8 ionization-chamber measurements).
- (4) Linear sum of estimated uncertainty limits due to
- |  |              |
|--|--------------|
| a) gravimetric measurements in the preparation of the Standard   | 0.10 percent |
| b) calibration of the pressurized "4 $\pi$ " $\gamma$ ionization chamber, which is the linear sum of estimated uncertainty limits due to |              |
| 1) half the 99-percent confidence interval of the mean of four anticoincidence measurements  | 0.16 percent |
| 2) efficiency extrapolation  | 0.10 percent |
| 3) background  | 0.06 percent |
| 4) gravimetric measurements  | 0.11 percent |
| 5) half the 99-percent confidence interval of the mean of the ionization-chamber measurements  | 0.09 percent |
- (5) Limits of detection as a percentage of the gamma-ray-emission rate of the 1836-keV gamma rays emitted in the decay of yttrium-88 are
- |  |
|--|
| 0.1 percent between 20 and 1831 keV    |
| 0.01 percent between 1841 and 1900 keV |
- provided the impurity photons are separated in energy by at least 5 keV from photons emitted in the decay of yttrium-88.
- (6) NCRP Report No. 58, 1978, p.357.

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