TMA
Thermo Analytical Inc.

TMA/Eberline Albuquerque Laboratory
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Albuquerque, NM 87109
(505) 345-3461 • FAX # (505) 761-5416

CERTIFICATE OF CALIBRATION

Electroplated Alpha Standard

S.O.# S-02834
P.O.# 94-00186

Description of Standard:

Model No. DNS-11 Serial No. 1819-94 Isotope 230 Th

Electroplated on polished nickel disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2 pi alpha emission rate was measured using an internal gas flow proportional chamber. Absolute counting of alpha particles emitted in the hemisphere above the active surface was verified by counting above, below and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated alpha source S/N 2393/91.

Measurement Result:

The observed alpha particles emitted from the surface of the disc per minute (cpm) on the calibration date was

9070 ± 363

The total disintegration rate (dpm) assuming 1.5% backscatter of alpha particles from the surface of the disc, was

18,100 ± 726 (0.00817 μCi)

The uncertainty of the measurement is 4 % which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: Charles R. Lamborn

Calibration technician: Charles R Lamborn

Calibration date: 5-13-94

Reviewed by: Arlene A Antony

Q.A. Representative: Kathy Burnham

Reviewed date: 5-13-94

Thermo NUtech
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CERTIFICATE OF CALIBRATION

Electroplated Beta Standard

S.O.# S-03241
P.O.# 1002

Description of Standard:

Model No. DNS-12 Serial No. 2313-97 Isotope ^{99}Technetium

Electroplated on polished nickel disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2pi beta emission rate was measured using an internal gas flow proportional chamber. Absolute counting of beta particles emitted in the hemisphere above the active surface was verified by counting above, below, and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated beta source S/N 2148/90.

Measurement Result:

The observed beta count rate from the surface of the disc per minute (cpm) on the calibration date was:

10,200 ± 408

The total disintegration rate (dpm) assuming 25 % backscatter of beta particles from the surface of the disc, was:

16,300 ± 653 (0.00736 μCi)

The uncertainty of the measurement is 4 %, which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: Charles Lamborn Reviewed by: [signature]

Calibration Technician: [signature] Q.A. Representative: [signature]

Calibration Date: 10-03-97 Reviewed Date: 10-7-97

CABRERA SERVICES
RADIOLOGICAL - ENVIRONMENTAL - REMEDIATION

Source Data Page

Source	Activity (dpm or µCi)	S/N	Half Life (years)	Assay Date (if NIST)	Vendor
Cs137	< 5 nCi	543-96	30.07		ERG
Tc-99	.00136 uCi	2313-97	211,000		1
Th-230	.00817 uCi	1819-94	75,400		1

Project# 07-3080-04