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National Physical Laboratory

ICRM Life Sciences Working Group

P-32 Measurements

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Overview

- Hospitals on limited budgets are forced to source cheaper supplies of radio-pharmaceuticals
- NMI's on limited budgets want to help as best they can
- Report on some ongoing work at NPL to investigate problems with P-32

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P-32 : Certificate from Supplier

Certificate of radioactive source No. DP1-1-022/30/08/0004

Preparation	**Sodium orto-phosphate $Na_2H^{32}PO_4$ for injection**
Form	solution
Code	MP-9
Batch No.	15/08
Activity on calibration date	**185 MBq** ± 10 % on day 30.07.2008 (12:00 CET)
Activity on dispatch date	273 MBq on day 22.07.2008
Radioactive concentration	92,500 MBq/cm^3
Specific activity	> 11,100 MBq/mg P
Registration No.	R-3264
Radiochemical purity	>99,0%
Radionuclidic purtity	>99,5%
Volume	2,00 cm^3
Quantity	**1**
Expiration date	13.08.2008

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Quality Control Report
Ref date : 30/7/2008

TEST	SPECIFICATION	METHOD	RESULT
Characteristics: Appearance of the solution	clear and colourless	visual inspection	Complies
Radionuclide identification	Beta-ray spectrum E_{max}=1.71 MeV	beta – spectrometry	Complies
pH	6.0 – 7.0	colorimetric	6.2
Radionuclidic purity:	≥ 99.5%	gamma-spectrometry	> 99.5 %
Radiochemical purity	≥ 97%	Paper chromatography	99.6 %
Chemical purity	Ba, Ni,Pb ≤ 5 µg/ml B, Zn, Al ≤ 10µg/ml Si, Mg, Ca ≤ 20µg/ml	ICP-OES spectrometry	Ba=0.4,Ni<0.2,Pb<0.2, B=1.7, Zn<0.1,Al<0.1, Si=5.5,Mg<0.5,Ca<0.2
Radioactive concentration	37 - 370 MBq/ml	Ionization chamber	185.0 MBq/ml
Specific activity	≥11.1 MBq/mg P	Ionization chamber / ICP-OES spectrometry	208 MBq/mg P
Sterility	Sterile	Direct inoculation	*)
Bacterial endotoxins	< 0.125 EU/ml	Gel - clot method	< 0.125 EU/ml

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Initial NPL Result
Ref Date : 30/7/2008

Measured on NPL Ionisation Chamber

- 113 MBq/cm^3 +/- 0.8%
- Result confirmed by 4π proportional counting

- CF : Manufacturers result
  - Bias : 18%
  - 92.5 MBq/cm^3 (???) +/- 10%

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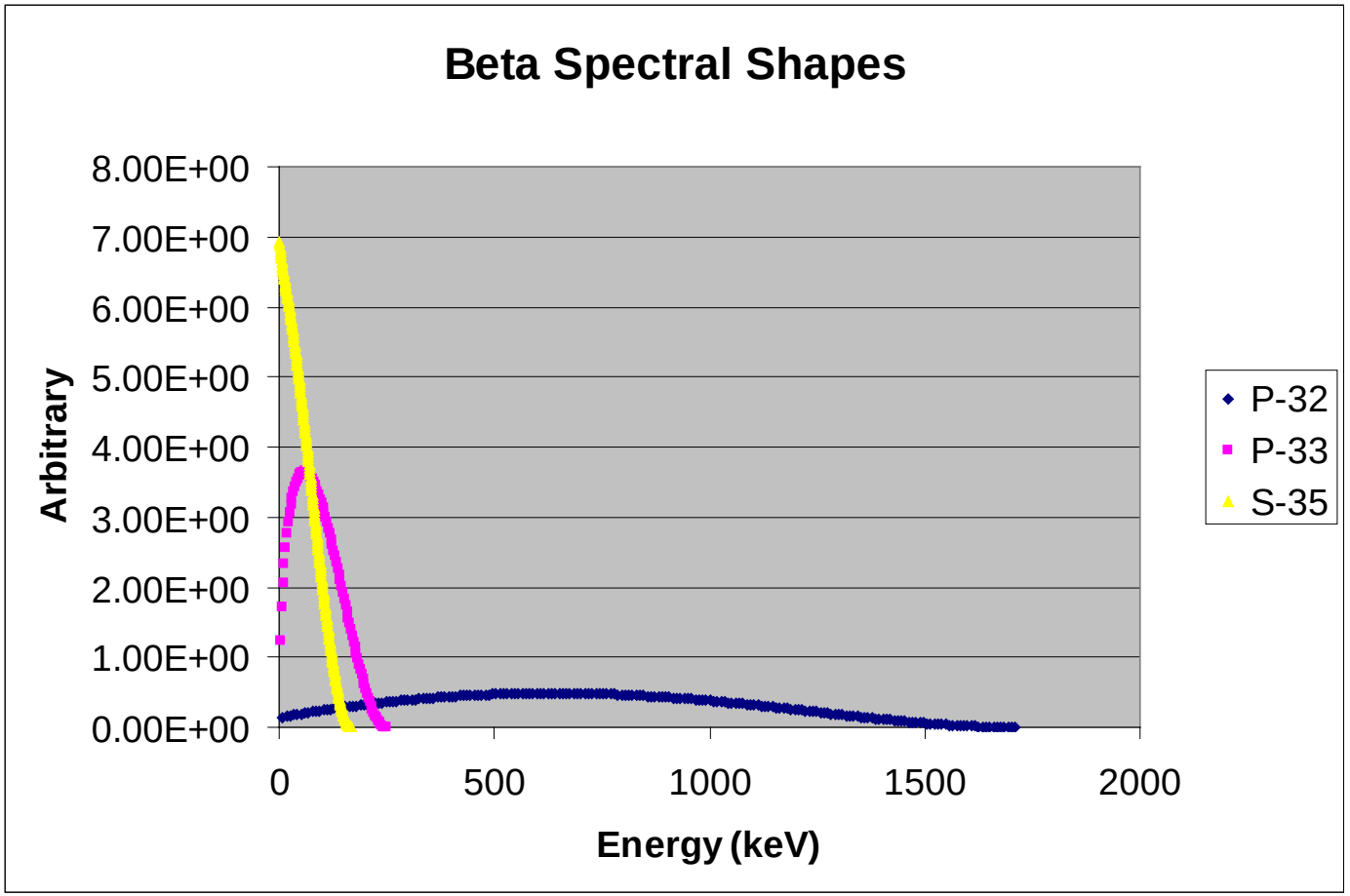
Beta Spectral Shapes



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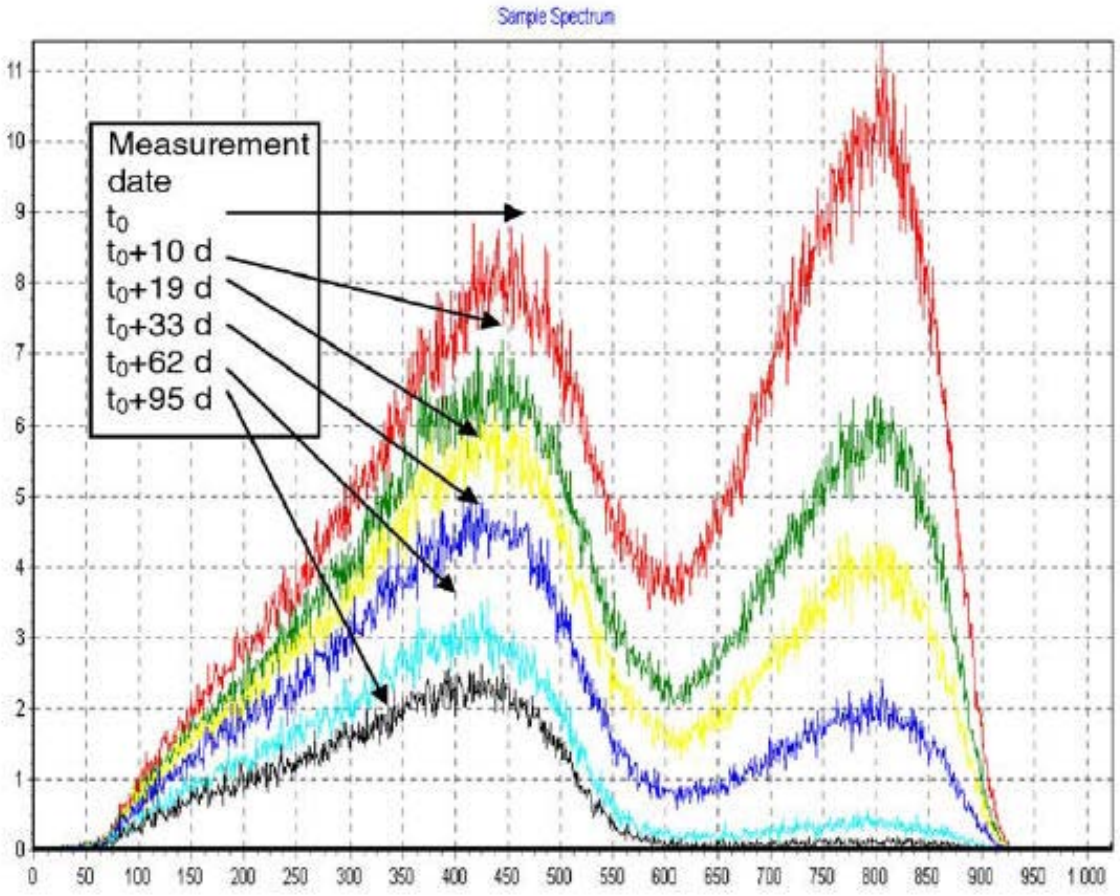
Liquid Scintillation Spectra

(LNHB Paper)



$$N(t) = N_{P32}e^{-\lambda_{P32}t} + N_{P33}e^{-\lambda_{P33}t} + N_{S35}e^{-\lambda_{S35}t}$$

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Measurements Ongoing

- Arzu Arinc (NPL) is continuing measurements
  - Initial estimates
  - P-33/P-32 : approx 3%
  - S-35/P-32 : 0.04%

  - No final uncertainties on these ratios yet
  - Continue to measure for another 2 months

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