SNO-STR-90-64

Report on INAA of Acrylic 27/4/90

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A number of samples of acrylic have been neutron activated in McMaster University's reactor. Nine samples of Rohm and Haas, Canada, acrylic were cut from different places on a single sheet 3/4" thick. This acrylic had paper on two sides. After cutting to size they were cleaned in alcohol. In addition, pieces of acrylic from Polycast (P2) and Cyro, supplied by Ted Clifford, were irradiated in a second irradiation. Irradiations generally last for two hours at a flux of about 10^{13} n/cm^2-s. The samples are sealed in aluminum canisters containing a small piece of $A\ell$ foil as the flux monitor. The $A\ell$ foil has been standardized for its Th and U content by comparison with geological rock standards. The $A\ell$ foil is found to be constant in Th and U to at least 10%.

Results

Table 1 shows the results for Th in the Rohm and Haas samples, and a few results for U. (The Np had decayed away in many samples before we could count them.) The results for Th are fairly constant, with two, apparently high samples, no's 3 and 5. An interesting correlation occurs, however, when we plot the total spectrum count rate of the sample (all have approximately the same weight, 8 to 9 gms.) versus the time at which it was counted, fig. 1. It is clear from this figure that sample #3 contains an excess of a long-lived element. An examination of the spectrum shows that it contains large excess of ^{59}Fe (x23) ^{60}Co (x20), and ^{65}Zn (x7) compared to the other acrylics. If we leave this sample out, then the average Th level in this acrylic is 31 ± 4 pg/g, with a χ^2 of 9.4 for 7 degrees of freedom, an acceptable fit. However we do not know whether the contamination observed in no. 3 is picked up from our laboratory or indicates inhomogeneities in the acrylic. We have examined the relative intensities of the ^{51}Cr, ^{59}Fe, ^{60}Co and ^{65}Zn lines in the $A\ell$ foils and it is clear that we are not contaminating the sample with aluminum.

Table 2 gives the results for P2 and two Cyro samples, as reported in Sudbury. The cause of the high U in P2 is not known. It is hard to see how it could have been contaminated in our laboratory since we do not use uranium.

We are still investigating the anomalous fission products, in particular ^{132}Te, seen in the samples. We will report on this later.

J.J. Simpson.

P. Jagam.

Table 1

Rohm and Haas (Canada) Acrylic

Sample no.	Th (pg/g)	U
1	54 ± 18	44 ± 16
2	33 ± 14	< 27
3	139 ± 43	74 ± 54
4	27 ± 9	< 100
5	74 ± 18	
6	28 ± 13	
7	34 ± 15	
8	18 ± 10	
9	26 ± 11	
Average (omitting #3)	31 ± 4	
	$\chi^2 = 9.40/7$	

Table 2

Acrylic

Sample	Th (pg/g)	U (pg/g)
P2	15 ± 6	1720 ± 130
Cyro #1	23 ± 7	58 ± 18
Cyro #2	29 ± 6	240 ± 40

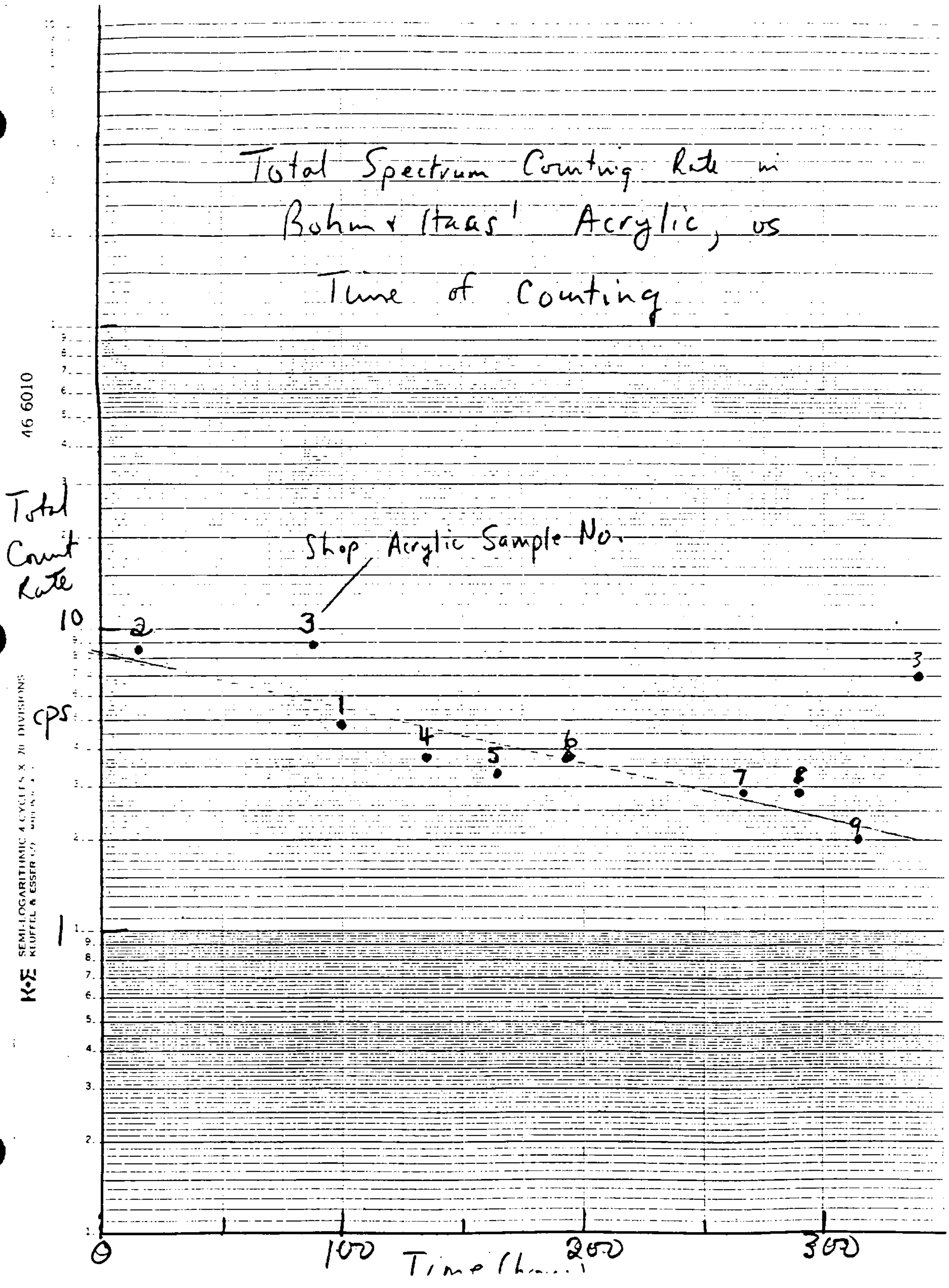
Total Spectrum Counting Rate in
Rohm & Haas' Acrylic, vs
Time of Counting
Total Count Rate
cps
Shop Acrylic Sample No.
10
1
2
3
1
4
5
6
7
8
9
3
0
100
200
300
Time (h...)
46 6010
K•E SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO.

Table II

7.70 MeV α + ^{27}Al

E_γ (keV)	Y_γ (per α)
4809	2.7×10^{-7}
5890	7.2×10^{-9}
6530	1.2×10^{-8}
6745	3.6×10^{-8}
6914	8.3×10^{-9}
7265	-
7635	1.9×10^{-9}

$$\sum_{5890}^{7635} Y_\gamma = 6.54 \times 10^{-8} \text{ per } \alpha$$

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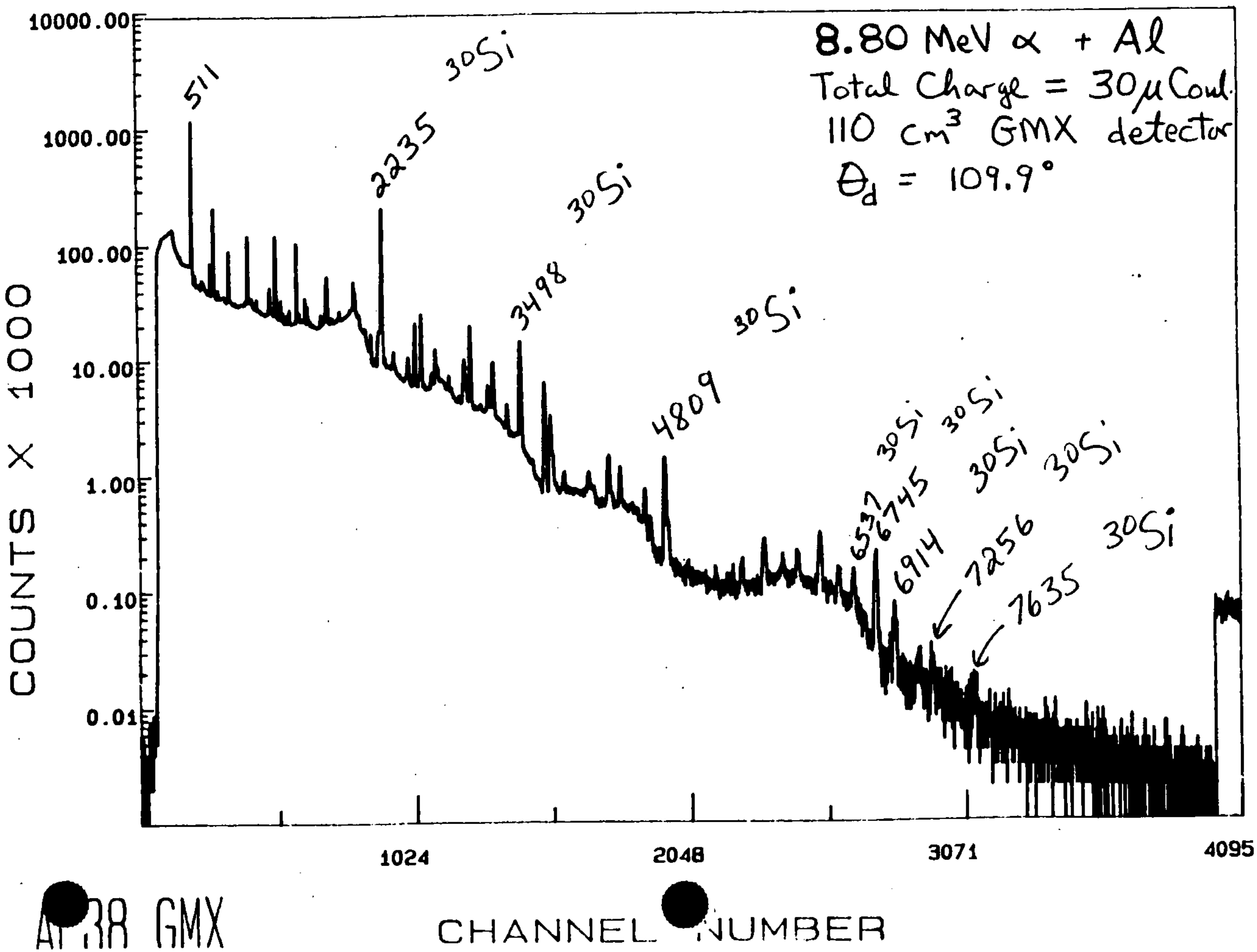

AP38 GMX

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