

## CHAPTER IV

## RESULTS

4.1 Purity of the Fraction. Fig. 4-1 shows the typical spectrum of a water sample after 12 hours irradiation and 6 days cooling. The interference from Na-24 was so high that no other peaks could be observed.

Fig. 4-2 shows the spectrum of the same sample after cooling for one month. When Na-24 all decayed, the gamma peaks of Br-82, Zn-65 and Sr-85 could be observed. These elements can be quantitatively analyzed without separation.

A Hg fraction separated from a sample was shown in Fig. 4-3. As the concentration of Hg in the sample was extremely low, only a small bump at 0.278 MeV could be observed. The other peaks originated from Br-82 which could not be separated from Hg by the present method.

Fig. 4-4 to Fig. 4-6 show separated fractions of Cu, Sb and As. The separation for these three elements was clean, since no  $\gamma$ -peaks from other elements could be observed.

Fig. 4-7 shows the separated fraction of Se. Due to the low cross-section for neutron absorption and the very low concentration, no  $\gamma$ -peak of Se was found.

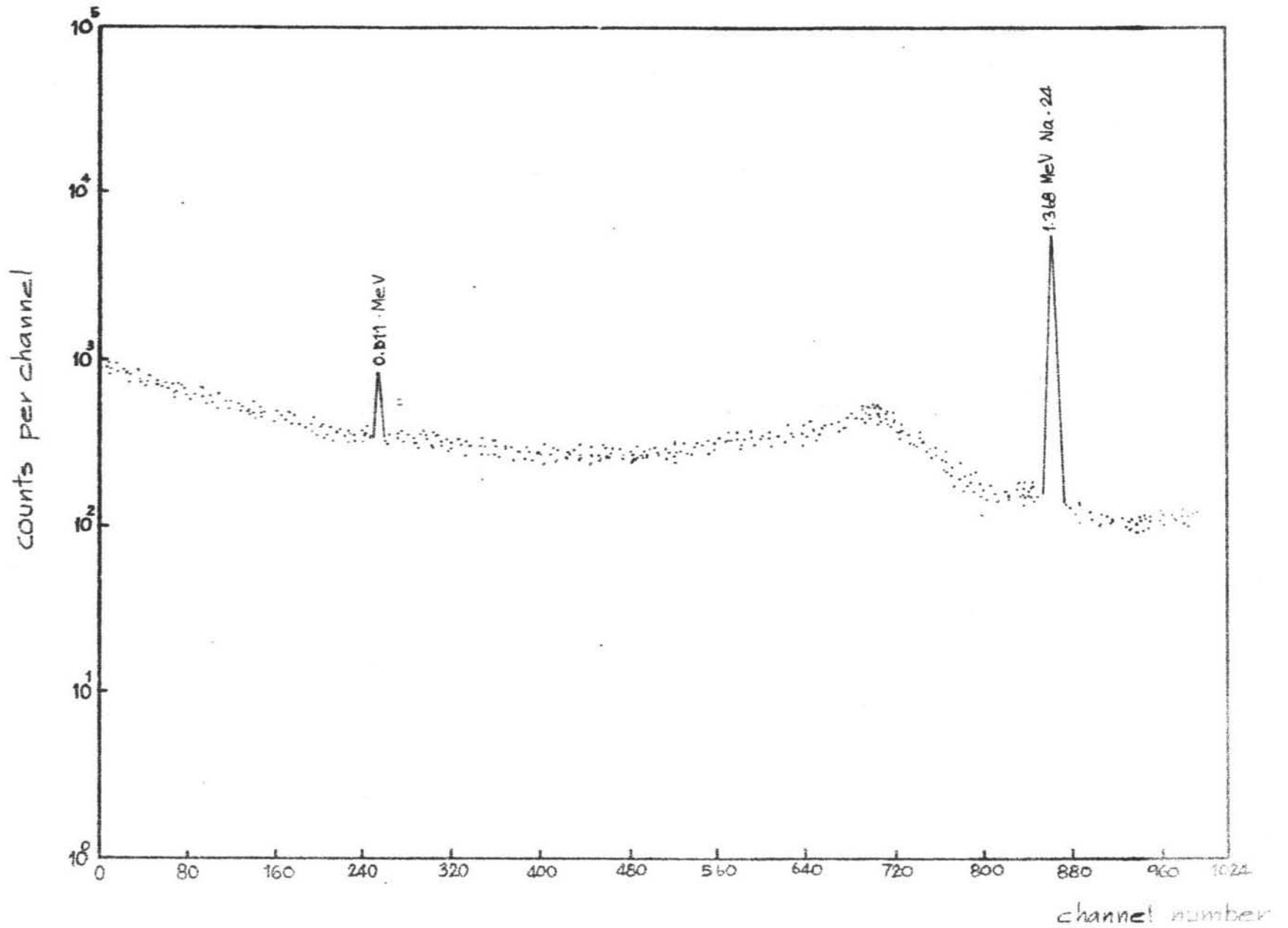


Fig 4-1 Spectrum of a River Water sample irradiation : 12 hrs., cooling : 6 days

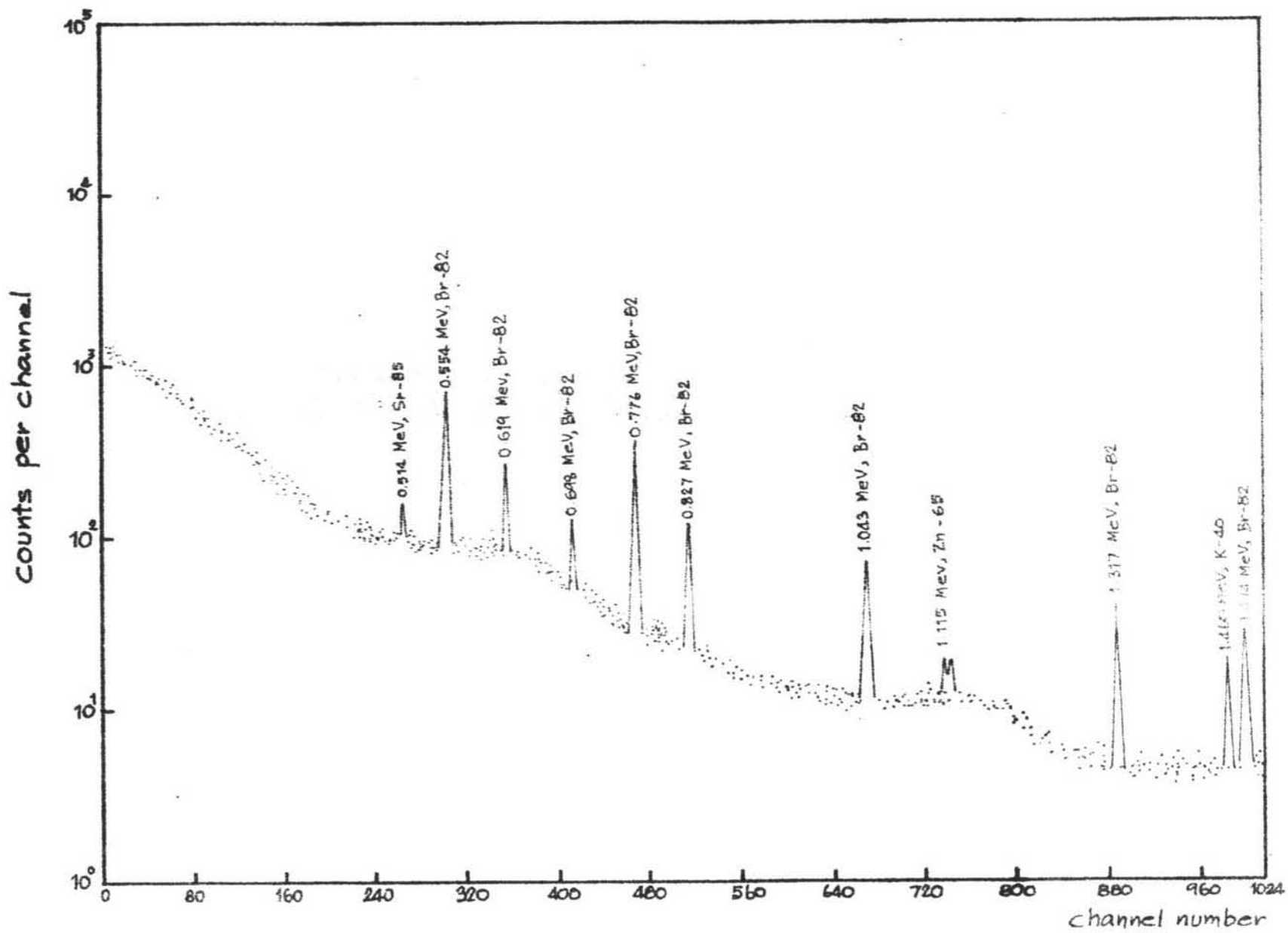


Fig. 4-2 Spectrum of a River Water sample, irradiation : 12 hrs. cooling : 1 month

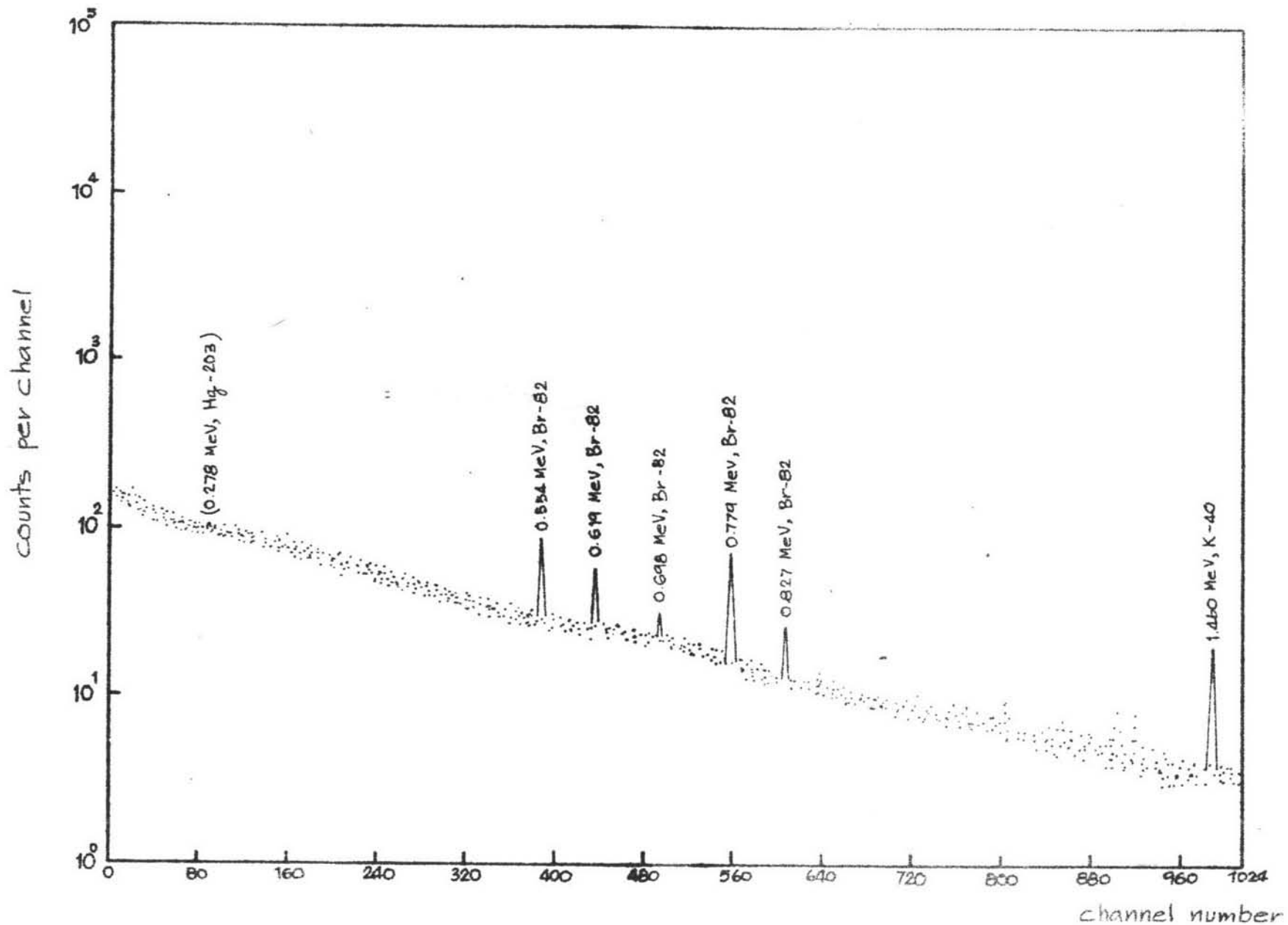


Fig. 4-3 Spectrum of the Hg fraction

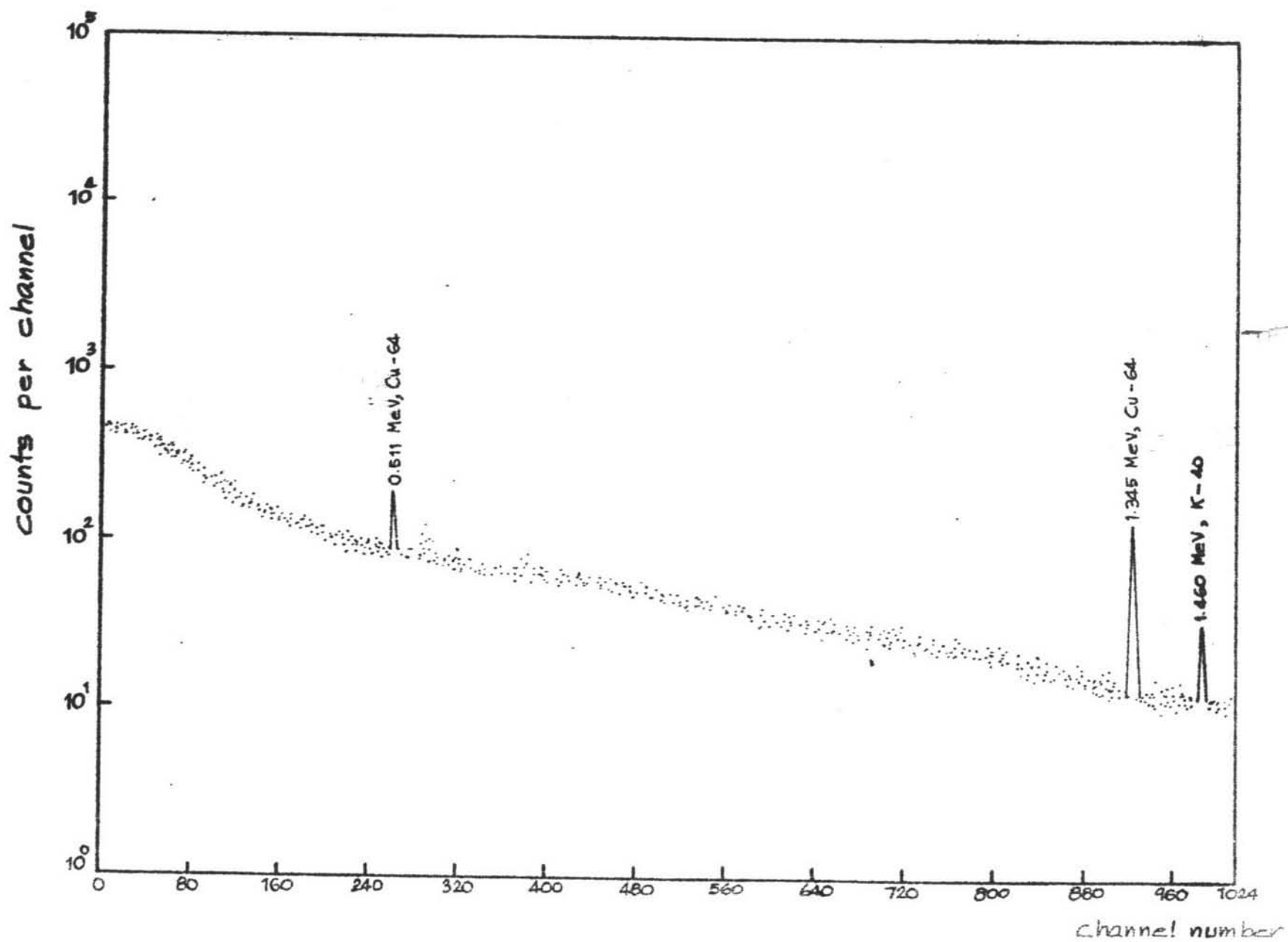


Fig. 4-4 Spectrum of the Cu fraction.

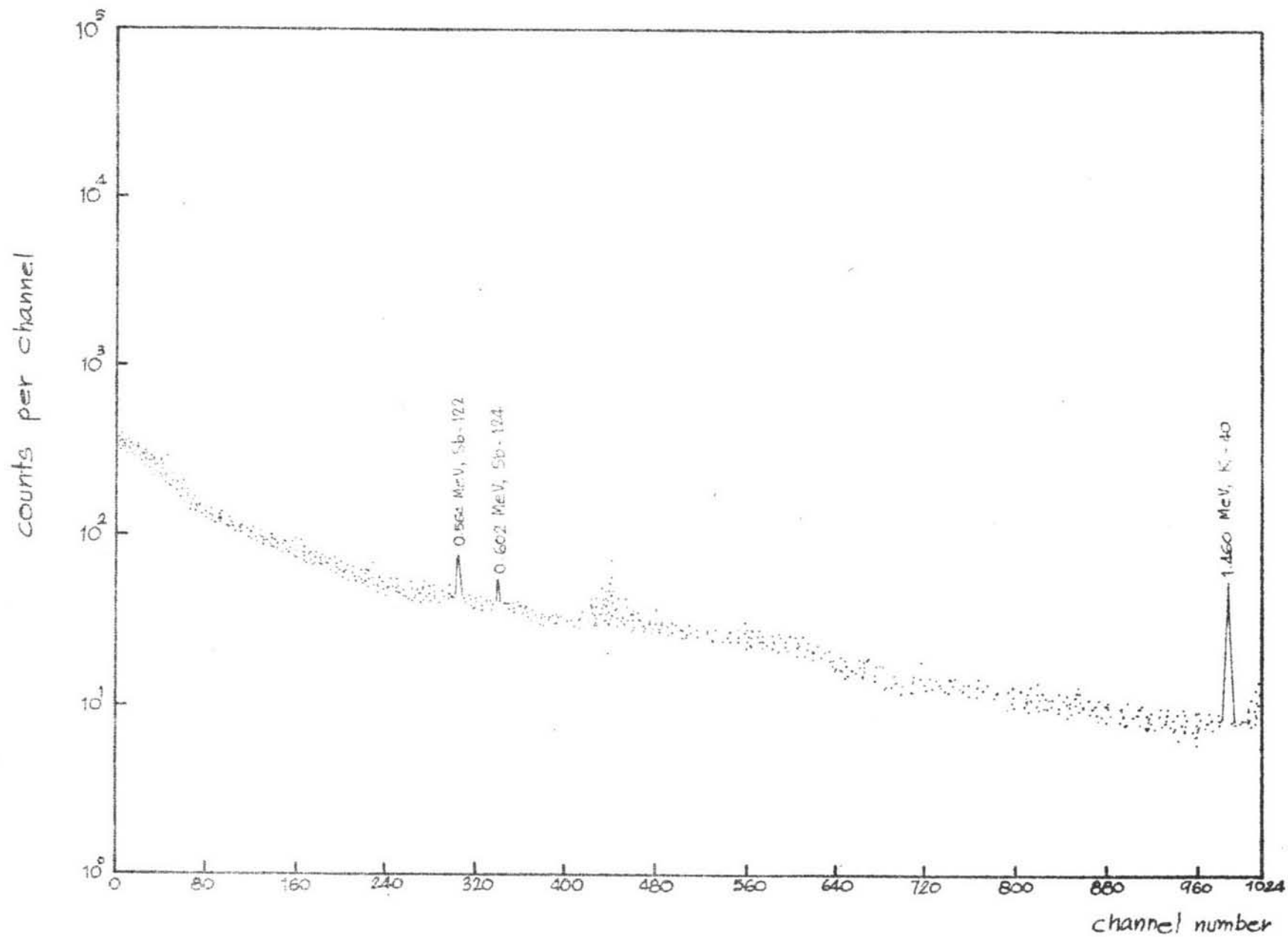


Fig. 4-5 Spectrum of the Sb fraction

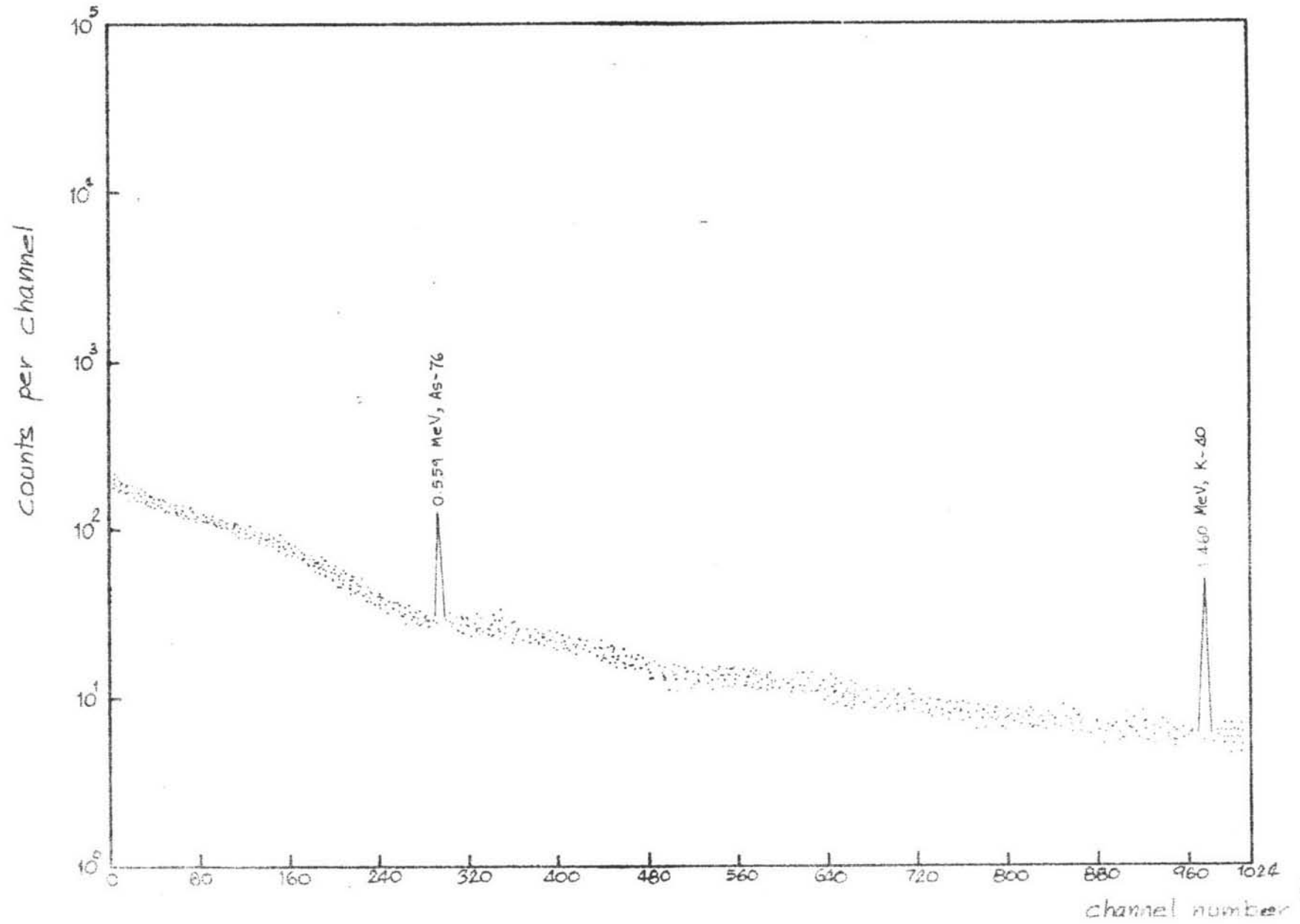


Fig. 4-6 Spectrum of the As fraction

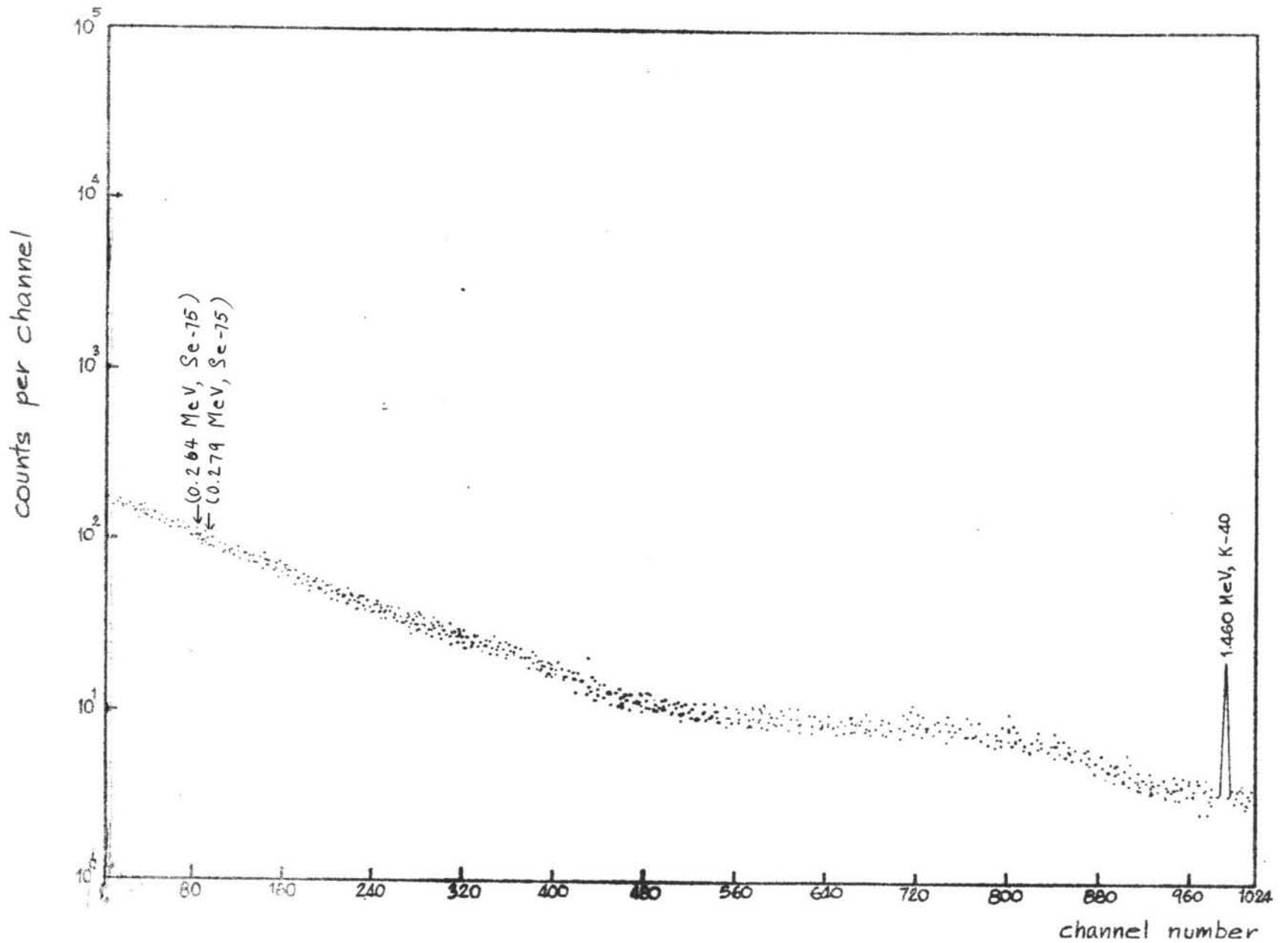


Fig. 4-7 Spectrum of the Se fraction.



4.2 Chemical Yield. The chemical yields of the elements obtained from the separation were checked by comparing their activities in the appropriate fractions with the activities of the single standard irradiated at the same period. Care was taken to assure that the single standards have similar matrices as the fraction to be compared with. Table 4-1 gives the results of the chemical yields from a single experiment.

Table 4-1 Chemical Yields of the separation process.

Elements	Peak area Standard	Peak area in Separated Fraction	Chemical Yields (%)
Cu(1 $\mu$ g)	105 $\pm$ 29 **	100 $\pm$ 30	95 $\pm$ 39
As(1 $\mu$ g)	367 $\pm$ 28	316 $\pm$ 26	86 $\pm$ 9
Sb(1 $\mu$ g)	759 $\pm$ 35	530 $\pm$ 49	69 $\pm$ 7
Hg(1 $\mu$ g)	32 $\pm$ 28	31 $\pm$ 28	96 $\pm$ 123
Se(1 $\mu$ g)	67 $\pm$ 36	63 $\pm$ 34	94 $\pm$ 72

\* Peak area  $A = a_0 + \sum_{i=1}^n a_i + \sum_{i=1}^n b_i^{-1}(n+1/2)(a_n + b_n)$  see Fig. 3-26

\*\*  $\sigma(A) = A + (n-1/2)(n+1/2)(a_n + b_n)^{1/2}$

4.3 Results of Sample Analysis. The results of 16 samples are given in Table 4-2 to Table 4-5. The results were from single determination. The imprecision of the method was mainly due to the error involved in the counting statistic on account of the low gamma counting rate.

Table 4-2 Trace element concentration (ppb) of Sample group I (Low tide), samples collected on April 22, 1974.

Element	Destructive Neutron Activation Analysis			
	A	B	C	D
Hg	N	N	N	N
Cu	21.29 <sup>±</sup> 2.94	0.158 <sup>±</sup> 1.56	5.52 <sup>±</sup> 1.23	6.68 <sup>±</sup> 1.22
Se	N	N	N	N
Sb	1.17 <sup>±</sup> 0.42	0.93 <sup>±</sup> 0.39	0.71 <sup>±</sup> 0.43	0.88 <sup>±</sup> 0.41
As	0.37 <sup>±</sup> 0.25	1.05 <sup>±</sup> 0.29	3.71 <sup>±</sup> 0.38	1.90 <sup>±</sup> 0.32

A = Samut Prakan

B = Bangkok Bridge (Bangkok)

C = Ban Sai Ma (Nonthaburi)

D = Nonthaburi Bridge

N = Not detectable

(Pathum Thani)

Table 4-3 Trace element concentration (ppb) of Sample group II (High tide), samples collected on April 22, 1974.

Element	Destructive Neutron Activation Analysis			
	A	B	C	D
Hg	N	N	N	N
Cu	24.90 <sup>±</sup> 0.29	13.26 <sup>±</sup> 0.46	7.35 <sup>±</sup> 1.61	7.99 <sup>±</sup> 1.66
Se	N	N	N	N
Sb	1.01 <sup>±</sup> 0.26	0.83 <sup>±</sup> 0.23	2.59 <sup>±</sup> 0.01	0.87 <sup>±</sup> 0.19
As	2.81 <sup>±</sup> 0.35	1.95 <sup>±</sup> 0.28	0.77 <sup>±</sup> 0.24	1.45 <sup>±</sup> 0.26

A = Samut Prakan

B = Bangkok Bridge (Bangkok)

C = Ban Sai Ma (Nonthaburi)

D = Nonthaburi Bridge

N = Not detectable

(Pathum Thani)

Table 4-4 Trace element concentration (ppb) of Sample group III (Low tide), samples collected on June 5, 1974..

Element	Destructive Neutron Activation Analysis			
	A	B	C	D
Hg	N	N	N	N
Cu	16.30 $\pm$ 2.98	16.63 $\pm$ 3.12	13.41 $\pm$ 2.52	14.84 $\pm$ 2.72
Se	N	N	N	N
Sb	0.26 $\pm$ 0.05	0.21 $\pm$ 0.05	0.29 $\pm$ 0.06	N
As	0.95 $\pm$ 0.15	1.39 $\pm$ 0.17	0.29 $\pm$ 0.14	0.90 $\pm$ 0.15

A = Samut Prakan

B = Bangkok Bridge(Bangkok)

C = Ban Sai Ma (Nonthaburi)

D = Nonthaburi Bridge

N = Not detectable

(Pathum Thani)

Table 4-5 Trace element concentration (ppb) of Sample group IV (High tide), samples collected on June 5, 1974

Element	Destructive Neutron Activation Analysis			
	A	B	C	D
Hg	N	N	N	N
Cu	26.41 $\pm$ 4.43	11.68 $\pm$ 2.20	9.74 $\pm$ 1.97	6.05 $\pm$ 1.48
Se	N	N	N	N
Sb	1.48 $\pm$ 0.29	0.50 $\pm$ 0.24	0.74 $\pm$ 0.27	0.57 $\pm$ 0.24
As	7.93 $\pm$ 1.06	2.50 $\pm$ 0.68	2.97 $\pm$ 0.70	2.64 $\pm$ 0.73

A = Samut Prakan

B = Bangkok Bridge (Bangkok)

C = Ban Sai Ma (Nonthaburi)

D = Nonthaburi Bridge

N = Not detectable

(Pathum Thani)