ОБЪЕДИНЕННЫЙ
ИНСТИТУТ
ЯДЕРНЫХ
ИССЛЕДОВАНИЙ

Дубна

E- 2464

G.M.Ter-Akopyan, L.A.Petrov, L.S.Vertogradov
V.A.Karnaukhov

PROTON EMITTERS AMONG Te ISOTOPES

ЛАБОРАТОРИЯ ЯДЕРНЫХ РЕАКЦИЙ

1965

E-2464

G.M.Ter-Akopyan, L.A.Petrov, L.S.Vertogradov
V.A.Karnaukhov

PROTON EMITTERS AMONG Te ISOTOPES

In the present work delayed proton emitters produced by the bombardment of Mo^{92}(92%) and Mo^{94} (91%) with Ne^{20} ions have been studied. This investigation has been performed to define more accurately our results on proton emitters in the reaction $Ru + O^{16}$ [1]. Since the same compound nucleus is obtained in the reaction $Mo + Ne^{20}$, it is natural to expect that in both cases the same kind of radioactive Te isotopes should be produced. Furthermore, we were interested in clarifying the contradictions of our results with those of A.Siivola[2]: when bombarding Ru^{96} with O^{16} ions he observed a proton emitter with $T = (5.3 \pm 0.4)$ sec. identified as Te^{108} whereas in our experiments[1] proton activities with $T = (11 \pm 2)$ sec. and $T = (60 \pm 10)$ sec. have been detected. A special probe described earlier[3] was used in the internal beam of the 310 cm JINR cyclotron. The proton activity was detected by means of a telescope consisting of a thin proportional counter and a surface-barrier detector.

The decay curve of the proton activity produced in the reaction $Mo^{92} + Ne^{20}$ ($E = 90$ MeV) is shown in fig. 1. The analysis of this curve indicates the presence of emitters with $T = (4.2 \pm 0.2)$sec. and $T = (13 \pm 2)$ sec.

Fig. 2 shows the proton spectrum of these nuclei (with corrections for proton energy loss before reaching the surface-barrier detector). It is noteworthy that approximately 90 percent of the protons of this spectrum belong to the first isotope.

The decay curve of the third proton emitter with $T = (19 \pm 0.7)$ sec. produced in the reaction $Mo^{94} + Ne^{20}$ ($E = 100$ MeV) is shown in fig. 3. By the irradiation of Mo^{94} a proton activity with $T = (60 - 80)$ sec. has been also detected. Thus it appears that the picture is more complicated than in[1,2]. In these experiments[1,2] the analysis of the decay curves was performed in an insufficiently wide interval of activity change, therefore some averaged values of half-lives were obtained which were different due to a different isotopic composition of the targets.

The excitation functions have been measured. The values of cross sections in maximum are given in the Table.

The analysis of the excitation functions most probably indicates that the first emitter is Te^{109} and the second one is Te^{111} The identification of the other two emitters is difficult yet due to their low yield.

The authors are grateful to Professor G.N. Flerov for his attention to their work and to A.N. Filipson with co-workers for the cyclotron operation. The authors are grateful to Professor R.E. Bell for useful and stimulating discussion.

Table

T sec	4.2	19	13	60-80
max	18	9	0.9	0.12

References

1. V.A. Karnaukhov, G.M. Ter-Akopyan, L.A. Petrov, V.G. Subbotin, Yadernaya Fizika 1, 1965, 812.
2. A. Siivola. Phys. Rev. Lett. 14, n. 5, 1965, 142.
3. G.N. Flerov, V.A. Karnaukhov, G.M. Ter-Akopyan, L.A. Petrov, V.G.Subbotin. Nucl.Phys. 60 , 1964, 129.

Received by Publishing Department
on November, 24, 1965.

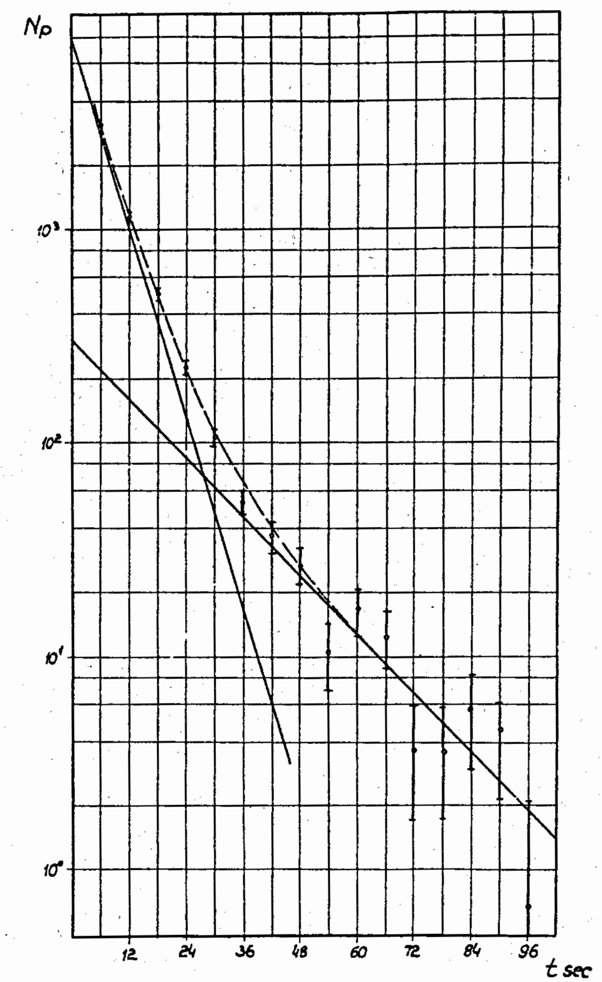

Fig. 1. The decay curve of the proton activity in the reaction $Mo^{92} + Ne^{20}$ (90 MeV). The width of the time channel is 6 sec. The straight lines correspond to half-lives of 4.2 and 13 sec.

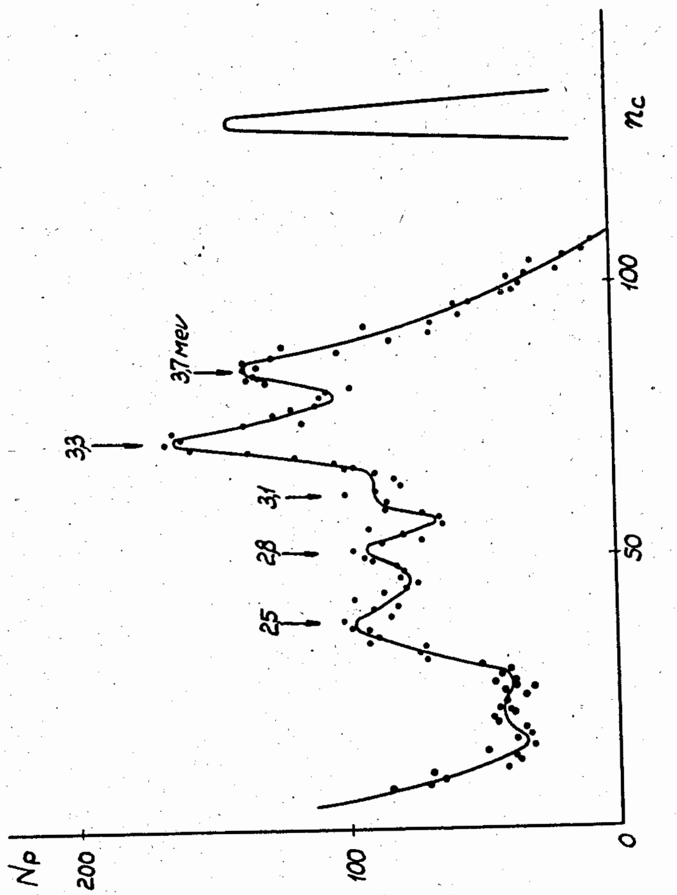

Fig. 2. The delayed proton spectrum. The alphas calibrating line is shown to the right.

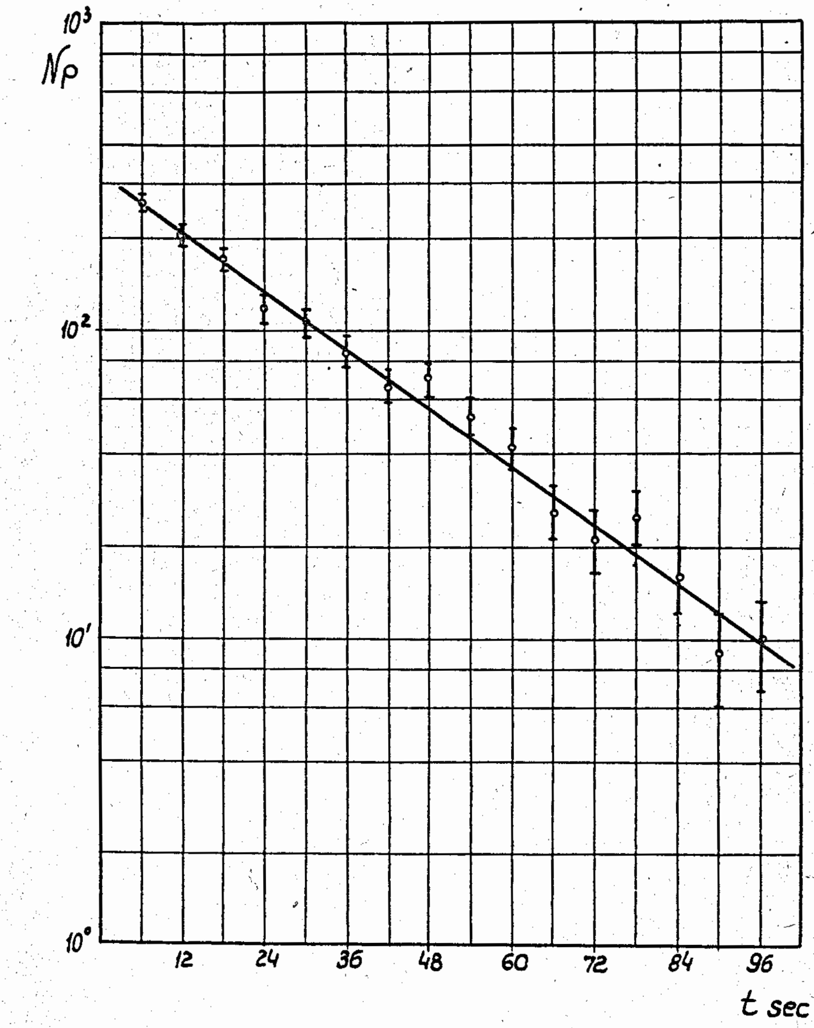

Fig. 3. The decay curve of the proton activity in the reaction $Mo^{94} + Ne^{20}$ (100 MeV). T = 19 ± 0.7 sec.