

TARGET RESIDUES FROM THE HIGH MULTIPLICITY EVENTS IN
THE INTERACTION OF 84 MeV/u C^{12} WITH Pb^{208} TARGET

B. Grabež*, R. Beckmann and R. Brandt

Kernchemie, FB 14, Philipps-Universität, D-3350, Marburg, W. Germany
*Institute of Physics, 11001 Belgrade, P. Box 57, Yugoslavia

The object of the present analysis are target residues found to originate from events with the high multiplicity of the emitted light particles (p,n,d,He) in the interaction of 84 MeV/u C^{12} with Pb^{208} target.

In our experiment the plastic nuclear track detector CR-39 was used. The Pb^{208} target was placed between two sheets of CR-39 what enabled detection of reaction products in 4π geometry. The prepared stacks were irradiated with 84 MeV/u C^{12} beam at CERN-SC (Geneva). After dissolving the target layers and track etching, identification of products has been done by measurement on to the finished tracks¹. Our experimental set up enabled detection of all products with $Z \geq 3$ in correlation.

The events characterised by the presence of only one heavy fragment with atomic number $Z \leq 70$ were separated and analysed. Since these target products have atomic numbers $30 \leq Z \leq 70$ and are not correlated with fragments with $Z \geq 3$, it is clear that they come from interaction with the high multiplicity of the emitted light particles (p,n,d,He).

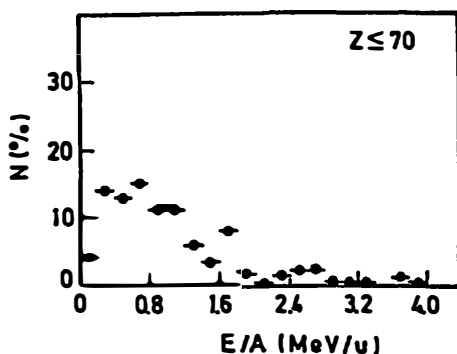


Fig. 1. Distribution of the recoil energy per nucleon for target residues with $Z \leq 70$.

According to Fig. 1. residues with $Z \leq 70$ are characterised by the relative high values and broad distribution of recoil energy.

As can be seen in Fig.2 the characteristic of the products studied in our experiment is that average values of their E/A or velocity are, in the limit of the experimental error, practically independent of their

atomic numbers. It means that their total energy (momentum)

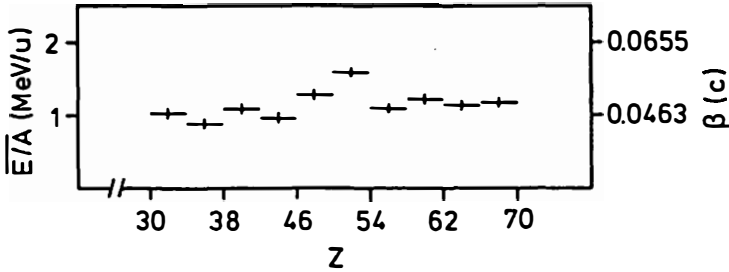


Fig. 2. Average values of the energy per nucleon (velocity) versus atomic number of the residues with $Z \leq 70$.

decreases with decreasing atomic number i.e. with the increase of the multiplicity of nucleons emitted during the interaction. This is opposite of the behaviour observed for spallation products after peripheral collisions.

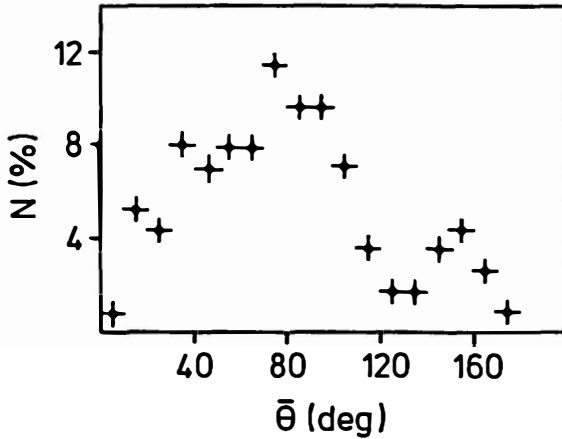


Fig.3. Angular distribution of the residues with $Z \leq 70$ in the projectile-target c.m. system. It is shown in Fig.3 that the angular distribution is sideward peaked in the projectile-target c.m. system. This is in agreement with predictions of the hydrodynamical model for the small impact parameter collisions^{2,3}.

In conclusion, target residues from the high multiplicity events in $84 \text{ MeV/u } C^{12} + Pb^{208}$ interaction have been investigated. It has been found that they have broad distribution of recoil energy, sideward peaked angular distribution in projectile-target c.m. system and mean velocity weakly dependent on their atomic numbers. The observed characteristics require further experimental and theoretical analysis.

1. B. Grabež et al. Nucl.Instr.Meth. 211, 209(1983)
2. G. Bertsch et al. Phys. Rev.C 18, 1293 (1978)
3. H. Stöcker et al. Z.Physik, A 294, 125 (1980)