PARTICLE-γ COINCIDENCES IN ^{16}O + ^{48}Ti REACTION AT 120 MeV

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ABSTRACT

Discrete gamma rays following deep inelastic collisions were detected in coincidence with charged fragments (C,N,O) from the ^{16}O + ^{48}Ti reaction at 120 MeV.

A 120 MeV ^{16}O beam from the ISN Grenoble cyclotron was used to bombard a self supporting target of ^{48}Ti (1.35 mg/cm^2). The lighter reaction charged products (Z = 1 to 10) were detected and identified with a Si-triple detector-telescope (23, 100, 1500 μm) located at 15° Lab. γ rays were measured in coincidence with a 70 cc GeLi detector and were used to identify the residual nuclei. The discrete γ-rays observed in coincidence with particles from the deep inelastic region were mainly transitions along the Yrast Line. As an example, the γ rays of ^{49}V detected in coincidence with ^{15}N in the deep inelastic region (E_x > 15 MeV) were mainly transitions from the $11/2^-$ (1022 keV) and $15/2^-$(2263 keV) states while for the ^{15}N quasi elastic peaks (E_x < 10 MeV), only the low energy transitions from the $5/2^-$ (91 keV) and $3/2^-$ (153keV) states to the ground state ($7/2^-$) were observed.

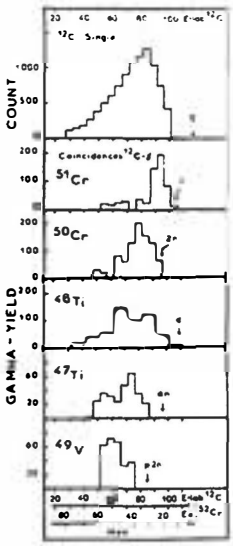

Fig. 1 (see text)

From the simultaneous mass and charge identification of both the light and the heavy partners, the missing charge and mass (table 1) were obtained unambiguously. Table I shows the relative γ yields for different residual nuclei detected in coincidence with ^{12}C. The complementary nucleus (^{52}Cr) represented only a small part of the total strength, while more frequently, one to five nucleon mass were evaporated. The single ^{12}C energy spectrum and the coincident spectra with discrete γ rays are represented in fig. 1. It shows that the deep inelastic bump may be decomposed into different evaporation-like components. The shape of the ^{12}C single spectrum was reprodu-

ced by the sum of coincident spectra, however the total radiation strength accounted only for part (∿ 50 %) of the single strength.

TABLE I Yield of nuclei identified by γ-rays in coincidence with ^{12}C

Residual nucleus	^{52}Cr	^{51}Cr	^{50}Cr	^{51}V	(^{50}V)	^{49}V	^{48}Ti	^{47}Ti
missing mass	0	n	2n	p	pn	p2n	α	αn
Relative yield	10±5	80±30	100±20	25±12	42±15	37±15	72±18	37±5