Production of Be^7 from O^{16} with Bremsstrahlung up to 57 MeV

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In the course of earlier experiments [1] on the photoproduction of Be^7 from beryllium, boron and carbon, the observation of the reaction $O^{16}(\gamma, x)Be^7$ was also reported. In the meantime this reaction has been studied in more detail. The activity of Be^7 was measured relative to that of C^{11} from the $C^{12}(\gamma, n)C^{11}$ process with a $3'' \times 3''$ ϕ NaJ(Tl)-scintillation spectrometer. The samples consisted of bidistilled water and reactor graphite. They were irradiated in various geometries at the Darmstadt 60 MeV electron linear accelerator.

The measured ratios of the yields are shown in Fig. 1 as a function of the maximum bremsstrahlung energy E_m. The yield is defined by

$$Y(E_m) = \int \sigma(E)\, S(E)\, dE$$

where $\sigma(E)$ is the cross section and $S(E)$ stands for the number of γ-quanta per energy interval. Those points in Fig. 1 with large uncertainties in the energy determination were obtained from irradiations with bremsstrahlung from the unanalyzed linac beam, the others from beams well defined in energy. The production cross section σ_y, given by

$$\sigma_y = E_m\, Y(E_m) / \int S(E)\, E\, dE\,,$$

is 0.012 mbarn at $E_m = 57$ MeV. Drawing a smooth curve through the measured points and calculating the cross section for the $O^{16}(\gamma, x)Be^7$ reaction as a function of photon energy yields a maximum at about 46 MeV and an integrated cross section of about 0.7 MeV mbarn to 57 MeV. The data given are based on the cross section for the $C^{12}(\gamma, n)C^{11}$ process as published by Barber et al. [2].

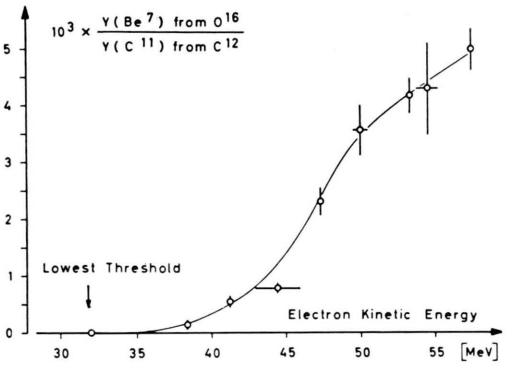

Fig. 1. Measured ratios of the yields $Y(Be^7)/Y(C^{11})$ as a function of electron kinetic energy E_m.

Recently, the $O^{16}(\gamma, x)Be^7$ reaction has also been observed by Nefkens et al. [3] for bremsstrahlung energies between 45 MeV and 275 MeV. These authors state a production cross section of 0.03 mbarn.

The $O^{16}(\gamma, x)Be^7$ process does not contribute significantly to the dipole sum for photon absorption. However, because the lowest threshold energy equals 31.8 MeV, it gives information on the nuclear photoeffect above the giant dipole resonance in the theoretically interesting nucleus O^{16}.

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[1] H. Artus, G. Fricke, and D. E. von Stein, Z. Phys. **178**, 109 [1964].
[2] W. C. Barber, W. D. George, and D. D. Reagan, Phys. Rev. **98**, 73 [1955].
[3] B. M. K. Nefkens, G. Moscati, and J. Todoroff, Abstract 4d/C421 of Contributed Papers to the „Congrès International de Physique Nucléaire", Paris, July 1964.

BERICHTIGUNG

Zu H. W. Drawin, Besetzungsdichten angeregter He I-Atome in einem nicht-thermischen Plasma, Band **19 a**, 1451 [1964].

Die Gl. (7) auf S. 1455 für Q_i lautet richtig

$$Q_i = \frac{\tilde{\omega}_i}{2\,\Sigma_+} \cdot \frac{h^3}{(2\pi m_e k T)^{3/2}}\, e^{+u_i} S_i\,,$$

$\tilde{\omega}_i$ = statistisches Gewicht.

Die numerischen Rechnungen wurden mit der richtigen Formel durchgeführt.

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