EXCITED LEVELS OF Ne^{22}

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The levels of the Ne^{22} nucleus in the interval from 1 to 9 Mev are determined from the proton spectrum of the $F^{12}(\alpha, p)Ne^{22}$ reaction.

WE obtained information concerning the levels of Ne^{22}, especially above 3.3 Mev, by studying the energy spectra of protons emitted at the laboratory angles 60° and 90° from the reaction $F^{19}(\alpha, p)Ne^{22}$. The α-particle energies were 10.3, 13.6, and 14.7 Mev. The experimental arrangement and the treatment of the experimental results were the same as in [1]. The target was a 1.3-mg/cm^2 tetrafluoroethylene film positioned at a 45° angle to the α-particle beam. Protons were registered on Ya-2 photographic plates. The mean energies of proton groups were determined from the range-energy curves for aluminum and nuclear emulsion. We used as reference points the energy of protons from $C^{12}(\alpha, p)N^{15}$ ($Q_0 = -4.965$ Mev) and of the p_2 proton group from $F^{19}(\alpha, p)Ne^{22}$, emitted when Ne^{22} is formed in its second excited state.

Our results for the Ne^{22} energy levels are compared in the table with values given in [2] and [3]. Levels at 6.37, 7.52, and 8.54 Mev are here reported for the first time. Our value for the third excited level agrees with [3] but differs considerably from [2].

Our data	Reference 2	Reference 3
1.30±0.05	1.28	1.3
3.36±0.05	3.3	3.3
4.46±0.10	4.9	4.4
5.30±0.10	—	5.4
5.76±0.15	—	5.7
6.37±0.12	—	—
7.52±0.15	—	—
8.54±0.15	—	—

In all instances the intensity of p_0 protons (associated with the formation of Ne^{22} in its ground state) was considerably lower than that of protons accompanying Ne^{22} formation in the first and second excited states. The p_1 intensity was 6 — 12 times greater than the p_0 intensity. This effect is apparently associated with the character of the shell structure in the initial F^{19} and final Ne^{22} nuclei. It should also be noted that in the case of the reaction $Al^{27}(\alpha, p)Si^{30}$ investigated by us previously [1] the energy spectra were similar, but the angular distributions of p_0 and p_1 protons indicated that direct interactions played a considerable role.

Note added in proof (June 15, 1961). A recent paper by Martin et al. [Phys. Rev. **121**, 866 (1961)] reports Ne^{22} levels up to 7.5 Mev, which agree with our results.

[1] A. M. Romanov, JETP **39**, 1540 (1960), Soviet Phys. JETP **12**, 1072 (1961).

[2] Foster, Stanford, and Lee, Phys. Rev. **93**, 1069 (1954).

[3] T. R. Ophel and I. F. Wright, Proc. Phys. Soc. (London) **71**, 389 (1958).

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