imply that these relations are also quite approximate). Of more positive significance is the conclusion from the observed angular asymmetry that the large contribution from the $^1D_2$ state of the initial protons implies, independently of a specific model, that noncentral interactions are involved[6] (since the deuteron is mostly in an S-state).

Equation (1) suggests that the deuterons observed at an angle (Θ, Φ) may be polarized.[7] Indeed, the direction of the polarization is given by the average values of the components of intrinsic angular momentum of the deuteron, which are $J_x=-R\sin\Phi$, $J_y=R\cos\Phi$, $J_z=0$ (i.e., at right angles to the plane defined by the direction of the protons and the deuterons).

The degree of polarization (considering just the P-wave component of the cross section), $R'(0<R'<1)$, is given by the numerical magnitude of

$$R=3\sqrt{2}\epsilon\sin\sigma\cos\Theta\sin\Theta[F(\Theta)]^{-1}, \quad (5)$$

where F is given by Eq. (2). R vanishes for a pure $\cos^2\theta$ angular distribution.

The detection of this polarization, if nonvanishing, would appear feasible. The beam of deuterons produced is more intense than the accompanying meson beam,[8] which has been used to study meson scattering.[9] A possible means of detection would be by means of (d, p) scattering, the polarization effects of which have been used by Wouters[10] to measure polarization in (n, p) scattering.

* This work was performed under the auspices of the AEC.

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Some Excitation Functions for Protons on Magnesium*

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(Received July 24, 1951)

In continuation of our study of proton-induced reactions on light and intermediate nuclei[1] we have determined the yield of Na^{22} as a function of energy for protons on Mg^{24}, Mg^{25}, and Mg^{26}. The experimental method has been previously described.[1,2]

Bombardments were made on natural MgO and on MgO enriched[3] in Mg^{25} and Mg^{26}, at initial energies of 100 and 70 Mev. Al metal foils were placed in the target stack with the MgO, and the Mg reactions were monitored by comparing them with the known excitation curve for $Al(p, 3pn)Na^{24}$ as measured by Hintz.[2] Bombardment times of approximately 12 hours were required to obtain sufficient activity for accurate counting. Since the half-life of Na^{24} is only 15 hours, some error may have been introduced by variations in the beam intensity during the bombardment.

The monitor foils were counted 24 hours after the end of the bombardment, when all activities with half-lives shorter than the 15-hour Na^{24} had disappeared. The MgO targets were counted after three weeks, when only the 2.6-year Na^{22} remained. The Al foils were also counted at this time, and the previous Na^{24} count was corrected for Na^{22} activity. All samples were counted, as nearly as possible, under the same geometry and mounting arrangements. Corrections were made for self-absorption and scattering and for absorption due to the air and counter window. The yield of Na^{22} from Mg^{24} was determined by subtracting the contributions of Mg^{25} and Mg^{26} from the yield obtained with the natural isotopic mixture. The results are shown in Fig. 1.

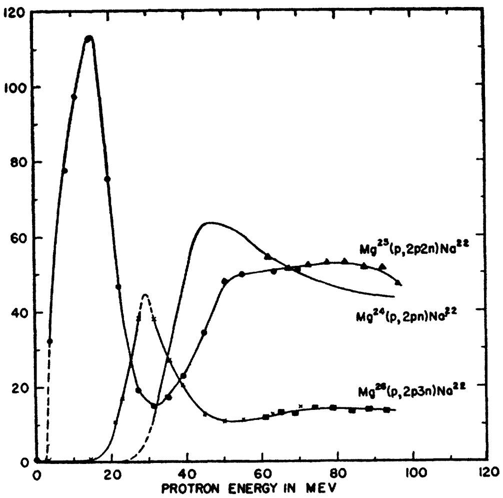

Fig. 1. Excitation function for protons on magnesium.

The thresholds to be expected, including the coulomb barrier heights, for the lowest energetically possible reaction and for single particle emission are shown in Table I. These lowest thresholds compare fairly well with the Mg^{25} and Mg^{26} excitation curves. However, accurate threshold energies cannot be determined by this method due to the thickness of the targets (20–30 mg/cm²) and the finite energy spread of the beam (0.5 Mev) on the target face.

It is evident that the emission of alpha-particles is a major mode of decay of these compound nuclei at low energies. It might be expected that the emission of other heavy fragments such as H^3 or He^3 would also be an important mode of decay. This does not seem to be the case. The observed threshold for $Mg(p, 2pn)Na^{22}$ at 20–25 Mev indicates a $(p, 2pn)$ or (p, dn) reaction rather than (p, He^3). Also if the emission of H^3 or He^3 were very probable, the minimum found in $Mg^{25}(p, 2p2n)Na^{22}$ at 30 Mev should not be so pronounced.

Table I. Thresholds in the laboratory system.

Reaction	$-Q$	$-Q$ +barrier
$Mg^{24}(p, He^3)Na^{22}$	16.6 Mev	22.5 Mev
$(p, 2pn)$	24.4	32.2
$Mg^{25}(p, \alpha)Na^{22}$	2.3	8.2
$(p, 2p2n)$	31.6	39.2
$Mg^{26}(p, \alpha n)Na^{22}$	14.1	20.0
$(p, 2p3n)$	43.3	50.9

* Assisted by the joint program of the ONR and AEC.

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Erratum: Non-Equilibrium Thermodynamics of Two-Fluid Models

[Phys. Rev. **81**, 1070 (1951)]

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The line following Eq. (1) should read: "between the two effects (v is the specific volume). We can derive. . . ."