TABLE II.

Scattering	Intensity of beta-rays Number per minute
(1) Al 0.19 cm thick cold-rolled	63.2 ±0.6
(2) Al 0.3 cm thick macrocrystalline	62.7 ±0.6
Difference	0.5 ±0.8 = 0.8 ±1.3%

by a scattering experiment. The beta-ray source and the aluminum scatterers were placed in such a way that the rays were deflected on the average by 90°. The scattering by a cold-rolled specimen was compared with that of a strain-free specimen consisting of a few very large crystals (about 1 cm). Identical surfaces were obtained by etching with dilute HCl shortly before the measurements. The difference in thickness of the scatterers is of no influence because the thinnest one is thicker than the range of the beta-rays. (Table II.)

The condition of the absorbers and scatterers was checked by x-ray back reflection photographs which confirmed that the intended states of deformation and recrystallization had been obtained in the cold-rolled and annealed specimens. The macrocrystalline scatterer gave the Laue diagram of an undeformed single crystal.

It is to be concluded from these experiments that the state of deformation in aluminum has no measurable effect (less than 1 percent) either on absorption or on scattering of beta-rays of such an energy that they are still able to penetrate matter of a surface density of 0.1 g/cm^{-2} after the absorption or the scattering.

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Mass of the Neutron

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THE commonly accepted value for the mass of the neutron is that by Bethe[1] who deduced a value 1.00893±0.00005 from the binding energy of the deuteron (2.17±0.04 Mev), the mass spectroscopic difference of H_2^1 and D^2 (0.00153±0.00004 mass units) and the isotopic mass of hydrogen (1.00813±0.00002 mass units). The mass difference of H_2^1 and D^2 and the isotopic mass of hydrogen have since been revised by Mattauch[2] are adopted by Aston[3] in his recent book. These values are 0.001539 ±0.0000021 and 1.008130±0.0000064 mass units, respectively. Modifying Bethe's deduction with these new figures and using the relationship: 1 Mass Unit = 931.4 Mev derived from constants given by Birge[4], the new mass of the neutron becomes 1.00892±0.00004 mass units.

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On the Intensity Distribution Among the Rotational Lines of AlO

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H. BRINKMAN* has found that the rotational intensity distribution in the AlO bands emitted by an electric arc between carbon electrodes loaded with Al_2O_3 does not depend upon the current intensity or the distance between the electrodes; the corresponding temperature is 4000°±300°, while the temperature obtained from the rotational intensity distribution of the CN bands emitted by the same arc is of the order of 6500°. Brinkman explains this result by stating that the AlO bands are emitted in the cool peripheric regions of the arc. It may seem strange that no temperature gradient is found between the 6500° zone (core of the arc, emitting the CN bands) and the 4000° zone (periphery of the arc, emitting the AlO bands).

In the course of a systematic investigation of the rotational intensity distribution in the AlO bands we have obtained a rotational temperature $T \cong 4000°$ in all the following cases of emission:

(a) explosion of thin wires of aluminum;
(b) arc between electrodes of hydronalium (alloy of aluminum and magnesium), for all currents from 3 up to 15 amp;
(c) condensed spark between electrodes of hydronalium;
(d) arc between electrodes of carbon loaded with grains of aluminum, burning in oxygen at a pressure of one atmosphere; temperature obtained $T = 4225 \pm 200$;
(e) same arc burning in air, i.e., oxygen pressure = 0.2 atmos.; $T = 4210 \pm 300$;
(f) same arc in vacuum, i.e., oxygen pressure, about 0.002 atmos.; $T = 4275 \pm 300$;
(g) arc between electrodes of carbon, loaded with Al_2O_3, burning in air; $T = 4175 \pm 225$;
(h) same arc, electrodes loaded with $AlCl_3$; $T = 3877 \pm 250$;
(i) same arc, electrodes loaded with $Al_2(SO_4)_3$, $T = 3950 \pm 300$.

The constancy of the rotational temperature obtained in such a wide variety of sources would seem to indicate that such a "temperature" does not give a real picture of the source, but may instead characterize a specific molecule. One may wonder whether the constant value of 4000° results from the mechanism of formation of AlO molecules from Al and O atoms, or whether 4000° is simply an optimum temperature for the formation and emission of AlO molecules.

In order to decide between these alternatives, sources have been investigated in which the temperature at all points could be expected to be lower than 4000°. First an oxyacetylemic flame was studied in which aluminum powder was dropped producing "explosions": the temperature obtained was still of the same order ($T = 4250 \pm 275$). But when using a flame, poor in oxygen, in which a flow of nitrogen containing aluminum powder was introduced, we found a definitely lower temperature, $T = 3050 \pm 250$.

This last result eliminates the first hypothesis suggested. It thus seems that we should consider $T \backsimeq 4000°$ as an optimum temperature for AlO emission. In sources presenting regions hotter than 4000° the AlO molecules subsist only in the relatively cool regions around 4000°; in such a case the rotational intensity distributions among AlO lines is not related to the highest temperature in the source. However, in sources cooler than 4000°, the AlO