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of this measurement and a preliminary analysis are given in report CP-684. A report containing the complete set of measurements will be issued in the future.

The Absorption Cross Section of Oxygen (H. Lichtenberger & H. Fowler)

The oxygen absorption cross section was measured by placing in the Argonne pile a tube containing liquid CO_2. The duraluminum tube had a length of 368 cm and an internal diameter of 6.35 cm; the wall thickness was 6.3 mm. When filled it contained 8150 grams of CO_2. In order that the slowing down of the material in the tube should be canceled out, the measurement consisted of obtaining the shift in the critical position when the tube was filled first with CO_2 and then with an amount of pure graphite which was to have the same slowing down as the carbon and oxygen in the CO_2. This amount of graphite was 5173 grams. The experiment was calibrated by placing cadmium wires of known cross section in the tube with the graphite and remeasuring the critical position. Table II summarizes the results obtained.

Table II

	Critical Position Corrected for Pressure
Tube empty and evacuated	329.94 cm
Tube filled with 8150 grams CO_2	330.66 cm
Tube + 5173 gms. AGOT graphite	330.42 cm
Tube + graphite + 6 Cd. wires evenly distributed along the length	326.66 cm

Each cadmium wire has a cross section for the neutrons in the pile = 1.0 cm^2. The $\sigma_{cd}^{(KT)}$ of each wire is estimated to be 1.25 cm^2 and, therefore, the cross section of the 6 wires added = 7.50 cm^2. The displacement of the rod due to the addition of the cadmium was 3.77 cm and, therefore, 1 cm displacement = 1.99 cm^2. The 5173 grams of AGOT graphite which were used in the tube have $\sigma^{(KT)}$ = 1.299 cm^2. The absorption of neutrons in this graphite caused a shift farther out of the rod = $\frac{1.299}{1.99}$ = .65 cm. Therefore, if there had been no absorption, but only [illegible] slowing down in the graphite, the position of the rod would have been 330.42 cm + .65 cm = 331.07 cm. The shift in position of the rod due to the absorption of CO_2 is 331.07 - 330.66 = .41 cm. The absorption cross section of the CO_2 in the tube is .41 x 1.99 = .815 cm^2. The carbon in the CO_2 produces part of the absorption and assuming that this carbon has the same absorption cross section as AGOT graphite, we find .56 cm^2 for the cross section. Therefore, the absorption cross section of the oxygen in the tube = .815 - .56 = .25 cm^2 and

$$\sigma_0^{(KT)} = .0011 \times 10^{-24}$$

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This measurement is subject to three principal errors. (1) Error in the determination of the critical position. The actual shifts observed are rather small and it is estimated that they could be in error by as much as 20%. In the cross section this amounts to .0004 x 10^{-24} cm^2. (2) Weights of CO_2 and graphite. The error here is entirely negligible. (3) Impurities