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Magnetic Velocity Analysis of Potassium Atoms Scattered by a Magnesium Oxide Crystal

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BIOLOGICAL FLUID OSMOTIC PRESSURE DETERMINATIONS

E. C. McCracken

An outgrowth of the method used by A. V. Hill to determine the next liberation accompanying the passage of a nerve impulse has resulted in the development of an apparatus by which the osmotic pressure of as small quantities of fluid as .5 cu. mm. may be determined to an accuracy of .1 per cent NaCl. The principle consists essentially in the differential cooling effect produced between the experimental sample and a standard solution when placed in a standard, constant temperature, constant humidity, environment. A discussion of the necessry thermocouple loop construction, electrical difficulties, and optical system is included in the report.

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MAGNETIC VELOCITY ANALYSIS OF POTASSIUM ATOMS SCATTERED BY A MAGNESIUM OXIDE CRYSTAL

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A beam of neutral potassium atoms is directed to the surface of a MgO crystal, incident at an adjustable angle of from 20 to 80 degrees. Perpendicular to this beam is a slit system which defines a second beam of atoms which have been scattered by the crystal. This second beam is directed to the region between a pair of Stern-Gerlach magnet pole pieces. The intensity of the beam is measured by means of a Langmuir-Taylor surface ionization detector.

By measuring the variation in beam intensity with varying angle of incidence of the primary beam on the crystal while the magnetic field is off, one finds that there is no effect of diffraction or regular reflection of the atoms at the crystal surface. The atoms emerge according to the simple cosine law.

With the application of the magnetic field the beam is broken up into two velocity spectra, in each of which the deflection of an

atom is given by $s = \frac{\mu \ \delta H}{^2mv^2 \ \delta z} A$ where μ is the Bohr magneton, $\frac{\delta H}{\delta z}$ is the gradient of the field perpendicular to the plane of the beam, A is a factor depending upon the geometry of the apparatus. The detector gives an accurate quantitative measure of the intensity distribution in the spectrum, so that the distribution in velocity may be calculated.

The results show that the velocity distribution is Maxwellian and is characteristic of a temperature very close to that of the crystal, although the crystal temperature was varied by 70 percent of the absolute temperature of the primary beam source. This distribution and the observed cosine scattering would be expected if the atoms adhered to the crystal surface for a short time and were re-evaporated.

The MgO crystals used in this research were furnished through the courtesy of Norton Company, Chippawa, Ontario.

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APPLICATION OF METAL SPRAYING TO THE CONSTRUCTION OF A HIGH VOLTAGE CONDENSER

R. D. Huntoon

In the construction of a high voltage condenser of the glass plate type it is necessary to coat relatively large areas (60 square yards in this case) with a smooth conducting layer well bonded to the glass. Spraying molten aluminum directly onto the surface was tried and found to give a suitable coating.

A description of the commercial Metal-Spray apparatus will be given and samples of the sprayed glass presented. Such factors as preparation of the surface, spraying technique, adhesion of the film, electrical resistance of the coating, and the effect of the heat on the glass will be discussed.

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