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Evidence of Energy Exchanges Accompanying Scattering of Atoms by Crystals

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THE VELOCITY OF ULTRASONIC WAVES IN ETHER VAPOR

GEORGE E. THOMPSON

The velocity of high frequency sound waves has been determined in ether vapor at several pressures. The velocity is slightly less at the higher pressures.

IOWA STATE COLLEGE,
AMES, IOWA.

EFFECT OF PIEZO ELECTRIC OSCILLATIONS ON X-RAY PATTERNS OF QUARTZ

P. H. CARR AND G. W. FOX

Experiments have been made to determine the amplitude of vibration of the atoms in a quartz lattice due to piezo electric oscillations. A series of Laue X-ray patterns have been made of quartz plates cut at various angles to the electric axes. Very marked intensity differences are apparent between the patterns made with the plates oscillating and not oscillating.

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AMES, IOWA.

EVIDENCE OF ENERGY EXCHANGES ACCOMPANYING SCATTERING OF ATOMS BY CRYSTALS

H. A. ZAHL AND A. ELLETT

The distribution of mercury atoms scattered from NaCl KCl, KBr KI has been studied by means of an ionization gauge as a function of angle of incidence and temperatures of scatterer and incident beam. The direction of maximum intensity makes an angle with the crystal normal not equal to the angle of incidence but always slightly less. The distribution can be well represented by

$A \cos \Theta + B \cos m (\alpha - \Theta)$ $(B = o$ when $|m (\alpha - \Theta)| > \frac{\pi}{4}$

The departure from specular reflection γ = (angle of incidence $- \alpha$) is greatest for high incidence, being 16° to 4° at an angle of incidence of 70° and about 5° at 45°. The values of A/B, m and γ depend on temperatures of crystal and beam. For rock salt at least, γ is less (more nearly specular) the colder the crystal and hotter the beam.

Since any incident beam gives rise to diffuse scattering (A cos Θ) plus directed scattering B cos m $(\alpha - \Theta)$ centered about a line making a greater angle with the crystal surface than does the incident beam it follows that the scattering is accompanied by an energy exchange.

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LENS EFFECT OF PRESSURE WINDOWS

CARL BENZ AND THOS. C. POULTER

The lens effect of pressure windows has been studied at pressures as high as 30,000 atmospheres. These lens effects are found to be due to four primary causes. 1st. Pseudo lens effect caused by temperature gradients in the material under pressure. 2nd. The bulging of the outside surface of the pressure windows. 3rd. The Pseudo lens effect due to unequal strains in the glass. 4th. The bulging of the inside surface of the window combined with the difference of index refraction of the material under pressure and the glass or quartz of the window. Methods for correcting for these lens effects are outlined.

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MEASUREMENT OF MEAN LIFE OF CADMIUM 2^3P_1 BY THERMAL MOTION OF EXCITED ATOMS DURING LIFE TIME

H. D. KOENIG

Since the experiments of Dunoyer in 1914 some interest has developed in an experiment to show the diffusion of excited atoms in various types of resonance lamps. None of these have been successful due to the short life time of the excited states in the vapors selected. Since experiments made in this laboratory indicate a long life for the Cadmium 2^3P_1 state, an attempt was made to measure the life of this state by the motion of the excited atoms in a unidirectional beam shot from a gun of the boiler type, and excited by passing through a narrow beam of light from a Cadmium discharge. The resonance radiation was photographed, a shield hiding the part of the beam in which the atoms were being