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Electrical Constants of Dielectrics for Radio Frequency Currents

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pass through two stages of power amplification, and are used as the input to a special oscillator attached to the end of the rod. This oscillator is similar in principle and construction to the Fessenden oscillator used in submarine sound signalling. Vibrations which have a fair purity of tone, and which have a considerable intensity over a wide range of frequencies are obtained in the rod.

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PRELIMINARY REPORT ON THE OPTICAL PROPERTIES OF MAGNESIUM

M. E. GRABER

The present research on the optical properties of single magnesium crystals was carried forward in the laboratories of the University of Iowa under the direction of Prof. L. P. Sieg. Employing the crystelliptometer, plane polarized monochromatic light was reflected from the crystal surface and the resultant elliptically polarized light analyzed to determine the phase and azimuth angles of its components. The crystals were studied in two positions: parallel and perpendicular, respectively, to the principle axis of the crystal, and two sets of optical constants (index of refraction, absorption index and reflecting power) were determined. Within the range of wave lengths studied (4160-6500A), the indices of refraction were:

First position, 0.25 to 0.36; second position, 0.30 to 0.44. The reflecting powers ranged from 63% to 80%, and the absorption indices from 3.6 to 7.

ELECTRICAL CONSTANTS OF DIELECTRICS FOR RADIO FREQUENCY CURRENTS

R. V. GUTHRIE, JR.

The electrical constants of dielectrics are the power factor and the dielectric constant, the power factor being that of a carefully insulated condenser using the given material as the dielectric. Losses in a condenser may be represented either as a series or a parallel resistance. If considered as in series, the losses may be determined by resistance variation, and if in parallel, the geometric capacity may be determined. From a consideration of both, the power factor ψ and dielectric constant K may be obtained from simple formulae. An investigation of several solid dielectrics over a band of frequencies ranging from 600,000 to 1,700,000 cycles per sec. showed K to be practically independent of frequency and ψ to change in a way that cannot be predicted. Measurements on about forty commercial dielectrics showed hard rubber to have much smaller losses than any other. Low losses were always accompanied by small dielectric constants, the reverse, however, not always being true.

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PHENOMENA OF CATHODE SPUTTERING

K. V. MANNING

When metal is deposited cathodically upon a glass plate a film is found upon the side of the plate away from the cathode. In the study of this deposit both alternating and direct potentials were employed. An attempt to increase the deposit by various reflecting surfaces gave negative results. A possible explanation of the phenomonen is offered, based upon the assumption that the metallic particles receive a positive charge after leaving the cathode. An attempt to sputter non-conductors in the form of metallic oxides gave negative results.

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THE OPTICAL CONSTANTS OF CRYSTALS OF SELENIUM AND TELLURIUM FOR WAVE-LENGTHS FROM 3000 TO 5000 A

R. F. MILLER

The measurements were made by a photographic method, for two positions of the crystal (1) with the optic axis parallel, and (2) with the axis perpendicular, to the plane of incidence. Two sets of optical constants were found for each substance. For *selenium,* in the parallel position the index of refraction was found to vary from 3.4 to 4.4, and the reflecting power from 0.38 to 0.46; in the perpendicular position the index varies from 2.3 to 3.1, and the reflecting power from 0.41 to 0.34. For *tellurium,* in the parallel position the index varies from 1.9 to 2.9, and the reflecting power from 0.10 to 0.27; in the perpendicular position the index varies from 1.7 to 2.7, and the reflecting power from