

change of the attenuation curves, the 30 MHz case exhibiting a considerably greater initial decrease in attenuation with t . We shall review these results and their significance in light of the niobium data of other workers.

- * Supported in part by ONR and ARPA.
- + Research work performed at Catholic University.

Supplementary Program

BE 16 Nucleation Field of a Thin Superconducting Film On A Thick Normal Layer, H. J. Fink, Swiss Fed. Inst. of Tech. and Univ. of Calif., Davis and P. Martinoli, Swiss Fed. Inst. of Tech., Zürich -- The nucleation field of a normal-superconducting double layer is calculated when the normal layer is thick and the thickness of the superconducting film is varied and is of order of magnitude of the coherence length in the superconducting metal. The

results are general and are exact when the transition temperatures of the two metals are not too different. The above theory is extended to metal layers with very different transition temperatures. When both metal layers are thick, the agreement with experiments by Fischer and Klein¹ on lead-copper films is good.

- ¹ G. Fischer, R. Klein, Phys. Letters **23**, 311 (1966).

MONDAY AFTERNOON, 29 MARCH 1971

(Y. H. PAO presiding)

PARLORS 1, 2, AND 3 AT 2:00 P.M.

Chemical Physics II

BF 1 Pressure Dependence of the Radial Distribution Function of Liquid Sodium, M. BUDKE-DAEG and J. M. SIVERTSEN, Univ. of Minn.* -- X-ray diffraction measurements were made on liquid sodium at various pressures in order to determine the effect of constant volume at temperatures between the melting point and 190°C on the radial distribution function. Measurements of the X-ray intensity were carried out with monochromated $\text{CuK}\alpha$ radiation at constant volume conditions and at several pressures differing from constant volume conditions. The raw intensity data were corrected for absorption, polarization, incoherent scattering effects and eccentricity of sample position. The corrected intensity data served as the input for the calculation of the Fourier Transform $4\pi r^2 \rho [g(r)-1]$. Results are discussed in terms of various models for the constant volume temperature dependence of $g(r)$, the radial distribution function.

*Department of Chemical Engineering and Materials Science

BF 2 Anomalous Alignment and Domains in a Nematic Liquid Crystal,* J.H. PARKER and E.F. CARR, Univ. of Maine.--The relation between anomalous alignment and domain formation is discussed. Employing visual observation and measurements of the dielectric loss at a microwave frequency of 24 GHz, the threshold voltage for domain formation is determined for MBBA. An increase in order with the long molecular axes preferring a direction perpendicular to an externally applied low frequency electric field is noted prior to domain formation. The threshold voltage is examined as a function of frequency for both techniques. Comparing optical and dielectric data we show that the critical frequency region associated with domain formation and that related to anomalous alignment are the same.

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BF 3 Anomalies in Reflection Spectrum of a Cholesteric Liquid Crystal, T.J. SCHEFFER and D.W. BERREMAN, Bell Telephone Labs, Murray Hill. --We have measured the reflection spectra of obliquely incident light from two different types of well-ordered cholesteric liquid crystal films: a cholesterol-derived room-temperature mixture and a high-temperature mixture not containing cholesterol derivatives. We

have also measured the shift of the second-order Bragg reflection band as the distance from a Grandjean discontinuity in a wedge-shaped sample is changed. The intensities and frequencies of the bands in the room-temperature film are in quite good agreement with Oseen's spiraling dielectric ellipsoid optical model and DeGennes' model of a Grandjean discontinuity. However, with the high-temperature liquid crystal film, the measured intensities of the reflection bands are too weak and the frequency shift of the bands at a Grandjean discontinuity is too small to fit these models. We will discuss possible modifications of Oseen's model that may resolve these discrepancies.

BF 4 Treatment of Droplike Clusters in Nucleation Theory Using Reiss' Method, RYOICHI KIKUCHI, Hughes Research. -- The expression of the correction factor ξ in the nucleation theory is derived extending the method Reiss used recently.¹ ξ is the factor appearing in the number of critical nuclei (formed as a vapor condenses into liquid drops) as a correction to the conventional theory. It is shown that $\xi = p_L v_g / kT$ where p_L is the pressure of the liquid phase inside the drop, v_g is the volume per molecule in the vapor phase, k is the Boltzmann constant and T is the absolute temperature. The difference between this ξ and Reiss' expressions is p_L which replaces his p_g (the vapor pressure in equilibrium with the drop). The ξ derived in this paper is compatible with the expression $\xi = v_g / v_L$ (v_L is the molecular volume in the liquid phase) previously proposed by the present author.²

- ¹ H. Reiss, J. Stat. Phys. **2**, 83 (1970).
² R. Kikuchi, J. Stat. Phys. **1**, 351 (1969).

BF 5 The Shear Viscosity of 3-Methylpentane-Nitroethane Mixtures in the Critical Region, B. TSAI and D. MC INTYRE, The University of Akron.--The viscosities of mixtures of 3-methylpentane and nitroethane have been measured over a large range of concentrations around the critical composition. The same compositions were also measured over a large temperature range of $T-T_c$, 0.003°C to 10°C. The solution at the critical composition was also measured over a large rate of shear, 10^3 to 10^{-2} sec⁻¹. The viscosity measurement fits a power law dependence of $T-T_c$, $\ln \eta = 0.97 - 3.12 \epsilon - 0.0388 \ln \epsilon$, where $\epsilon = (T-T_c)/T_c$. At large ΔT values the dependence is even greater. The con-