

CALCULATED RESULTS

As explained previously, the voltage-time trace depicted on the oscilloscope screen was readily converted to the corresponding pressure-time trace. The pressure-time traces were placed on the Telereadex film reader, and the time constants were obtained directly (time constant is the time corresponding to pressure P_g/e). The time constants determined in this manner are tabulated in Table I of the previous section.

Equation (62) was utilized to obtain time constant-pressure curves for fluids having various coefficients of viscosity. The effects of viscosity on the rate of release of pressurized fluid through 0.062-inch diameter orifices, as obtained from equation (62), are shown in Figure 25. Superposed on Figure 25 are the experimental data obtained under identical test conditions. The correlation between the analytical and experimental data is deemed good except at the extreme ends of the pressure scale. These discrepancies can be accounted for in the following manner. (1) The pressure recording gage and the calibration control gage are capable of measuring pressures in the range of 0 - 50,000 psi and 0 - 80,000 psi, respectively. However, a pressure gage does not respond accurately to pressures that occur at the extreme ends of its designed pressure range. (2) The viscosity-pressure relation defined in equation (61) for the subject fluids is valid only for pressures in the range of 0 - 35,000 psi.

In knock-off tubes where the bore diameter exceeds 0.062-inch, the flow of the pressurized fluid may cease to be laminar, i.e., the Reynolds number may be in excess of the critical value. Since the condition of laminar flow was invoked in the derivation of equation (62), it may not, in general, be valid for the larger diameter bores where the flow is transitional or turbulent. The pressure-release time data obtained for the

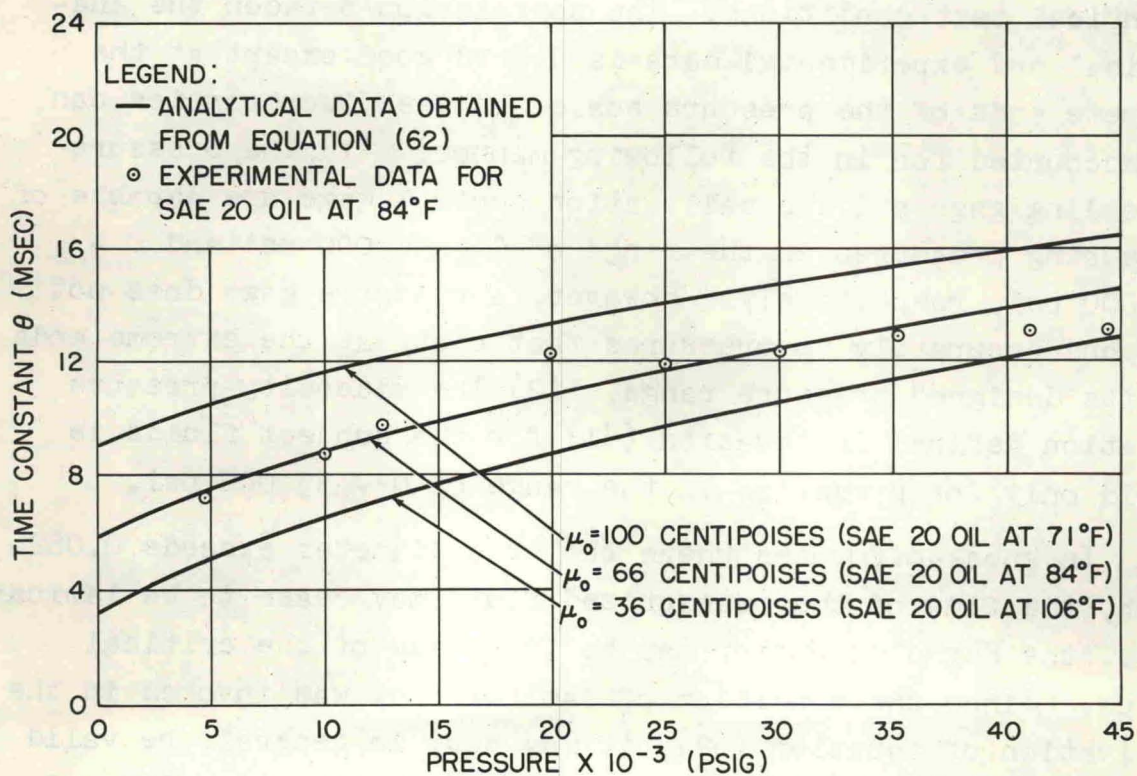
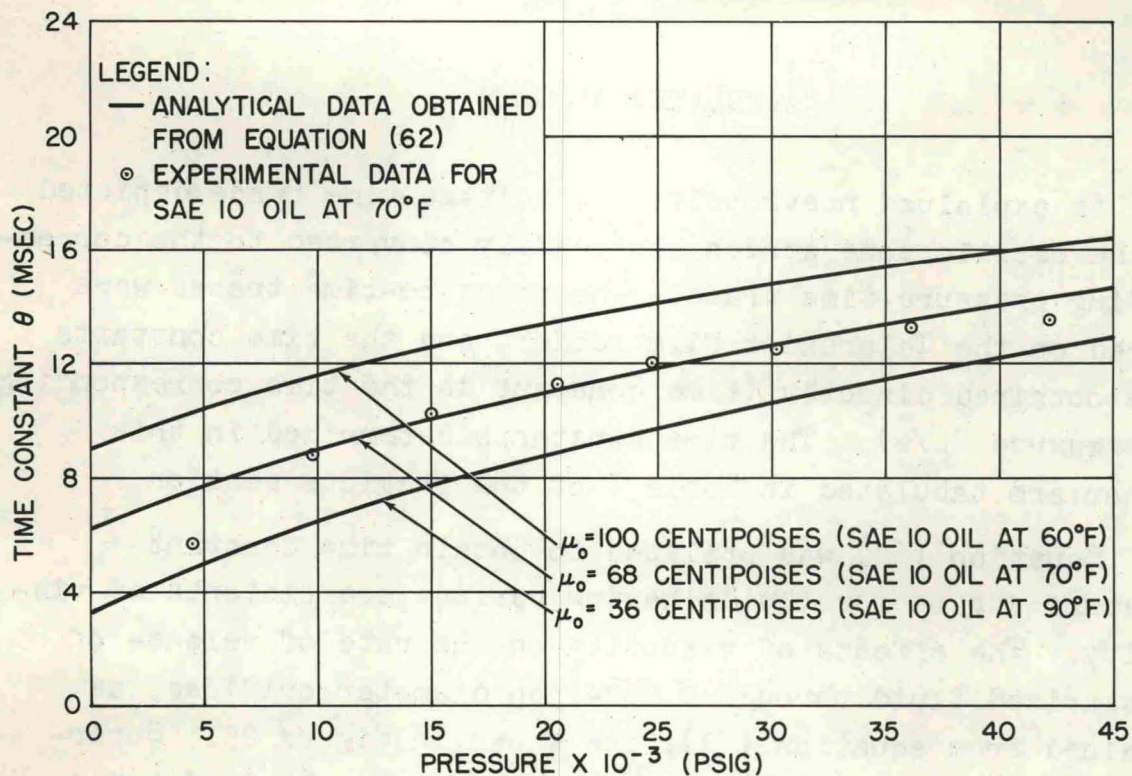


FIG. 25 EFFECTS OF VISCOSITY ON RATE OF RELEASE OF PRESSURIZED FLUID THROUGH 0.062-INCH DIAMETER ORIFICES