

**SEATTLE CHEMICAL INDUSTRIES
ENGINEERING DEVELOPMENT LABORATORY
SEATTLE, WASHINGTON 98195**

TO: Team E

FROM: Engineering Management

SUBJECT: Measurement of Transport Properties

It is occasionally necessary for us to obtain values for transport properties of materials with which we work in the laboratory. This information is not always available in the literature and we must sometimes make the measurements ourselves. Our laboratory, however, has not yet established standard procedures for the determination of the thermal conductivity and thermal diffusivity of solids and the viscosity of fluids.

We would like you to develop and test simple methods for measuring these transport coefficients. Specifically, we are asking that you:

- (1) develop procedures for determining the thermal conductivity and diffusivity of solids using both a steady state and a transient approach. A laboratory apparatus for heating and cooling a brass rod was constructed by a summer intern. Unfortunately, we do not know the brass composition but it is a standard alloy.
- (2) develop a simple experimental design to measure the viscosity of at least two fluids. For these measurements, try to avoid elaborate equipment or complicated procedures. We are most interested in methods that do not require the purchase of special measuring devices. Plan to use standard laboratory glassware, timers, thermocouples, etc.

Your report or oral presentation should discuss the procedures that you developed, the outcome of testing common materials, and your recommendations about using these procedures for other materials. Recommendations should be based on careful consideration of the accuracy and variability of the methods. We are particularly interested in the sources of inaccuracies.