

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

**TO:** Team A

**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. Please include an error analysis and discussion of sources of error in the measurements and design. Also, compare your results to literature values