**Vapor Pressure and Cavitation**

Boiling, which is the formation of vapor bubbles in a fluid system, is initiated when the absolute pressure in the fluid reaches the **Vapor Pressure**.

Cavitation is a term used to describe a process, which includes nucleation, growth and implosion of vapor or gas filled cavities. These cavities are formed into a liquid when the static pressure of the liquid for one reason or another is reduced below the vapor pressure of the liquid at the known temperature. When cavities are carried to a higher-pressure region they implode violently and very high pressures can occur. These processes and the collapse of vapor bubbles in a flowing fluid can cause structural damage to devices such as: pumps, turbines, and other turbomachines.

**Consider:**
A pump is moving ethyl alcohol at 20 deg. C. Estimate the minimum absolute pressure, kPa, which can be developed at the inlet to the pump to avoid cavitation.

**Surface Tension**

\[ \sigma = \frac{N}{m} \]

Apply to:

a. Liquid Drop Behavior
b. Capillary action – tubes
c. Float a Metal Rod or Razor Blade

\[ 2\pi R \sigma = \Delta p \pi R^2 \]

The cohesive forces between liquid molecules are responsible for the phenomenon known as surface tension. The molecules at the surface do not have other like molecules on all sides of them and consequently they cohere more strongly to those directly associated with them on the surface. This forms a surface "film" which makes it more difficult to move an object through the surface than to move it when it is completely submersed.

\[ 2\pi R \sigma \cos \theta = \gamma \pi R^2 h \]