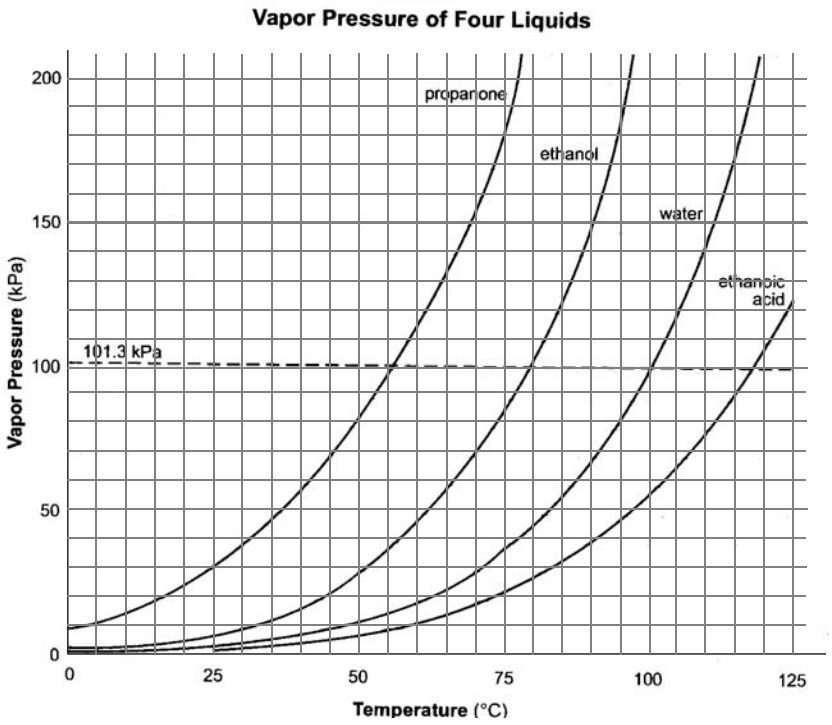
Vapor Pressure

An open glass of water left standing around will eventually evaporate even with out being heated. When water evaporates, it changes from a liquid to a gas called water vapor. Water vapor takes up more space than an equal mass of liquid water. As a result, in a closed container, the vapor that forms can exert a significant amount of pressure. This pressure is known as vapor pressure. Even in an open container, the vapor is confined by the air pressing down on it. Some of it collects at the surface and exerts pressure. Occasional high energy molecules at the water's surface escape. That is why the water eventually evaporates. But for a water to expand and form vapor bubbles throughout the liquid as it does when it boils, the vapor has to exert as much pressure as the blanket of air confining it. As a liquid is heated, more of it turns into vapor, and the vapor pressure increases. When the vapor pressure reaches atmospheric pressure, the liquid boils. Under greater external pressure, the liquid boils at a higher temperature.

The graph below shows the vapor pressures of four common liquids as a function of temperature. Refer to the graph to answer the questions that follow.



_____ **1.** Which of the substances above has the lowest boiling point?

_____ **2.** Which of the substances above has a boiling point of 100°C?

_____ **3.** Which of the substances above has the highest boiling point?

_____ **4.** Which of the substances above has the highest vapor pressure at 40°C?

_____ **5.** Which of the substances above will boil at 79°C?

_____ **6.** At what temperature will alcohol boil when the atmospheric pressure is 50 kPa?

_____ **7.** At what atmospheric pressure will propanone boil at 20°C?

_____ **8.** At what atmospheric pressure will water boil at 90°C?

_____ **9.** Which of the substances above has the lowest vapor pressure at 70°C?

_____ **10.** As the pressure decreases, the boiling point of water (a) increases, (b) decreases, (c) remains the same.

_____ **11.** What is the vapor pressure of water at 60°C?