

Chapter 10: States of Matter and IMF's

1. How many kilojoules of heat are absorbed when 1.25 moles of water are converted from liquid at 90.0°C to vapor at 100°C? The specific heat of liquid water is 4.18 J/g°C. The heat of vaporization of water is 44.0 kJ/mol at 100°C.

2. The combustion of 1.25 g of pentane produces enough heat to vaporize 165 g of hexane. What is the molar enthalpy of vaporization of hexane?



3. The density of methanol vapor in equilibrium with liquid methanol, CH₃OH, at 25°C is 0.207 g/L. What is the vapor pressure of methanol, in mmHg, at 25°C?
4. An ice cube weighing 15.0 g at a temperature of 0.0°C is added to 85.0 mL of water at 30.0°C in an insulated container. What will be the final temperature after the ice has melted? $\Delta H_{\text{fusn}} = 6.01 \text{ kJ/mol}$ and the specific heat of water = 4.18 J/g°C.

5. Using the vapor pressure curves provided below, predict:

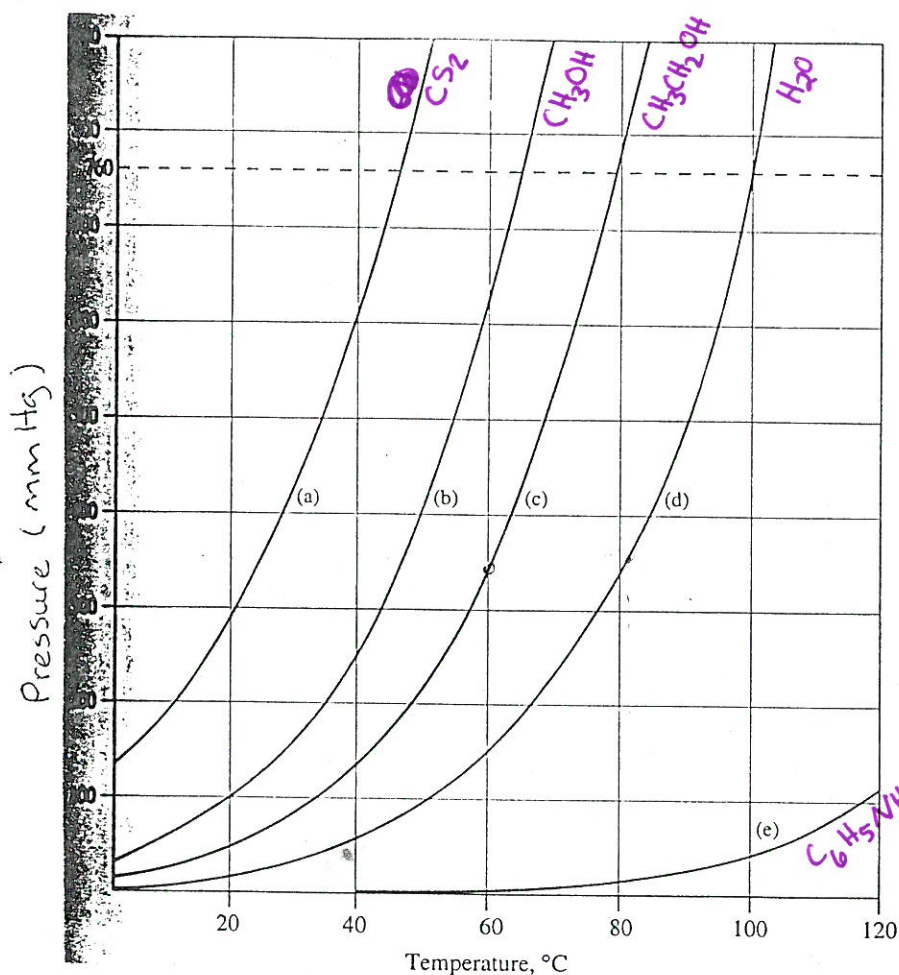
_____ The vapor pressure of ethanol at 60°C.

_____ The boiling point of water when the barometric pressure is 350 mmHg.

_____ Which substance is least volatile.

_____ Which substance has the strongest IMFs

_____ What type(s) of IMFs are responsible for the high boiling point of aniline



◀ Figure 11.4
Vapor pressure curves of several liquids
(a) carbon disulfide, CS_2 ; (b) methanol, CH_3OH ; (c) ethanol, $\text{CH}_3\text{CH}_2\text{OH}$; (d) water, H_2O ; (e) aniline, $\text{C}_6\text{H}_5\text{NH}_2$.

6. Evaluate each of the following in terms of their IMFs.

a. Which would you expect to have a higher boiling point and why?

Pentane: C_5H_{12} or 2, 2-dimethylpropane: $\text{CH}_3\text{C}(\text{CH}_3)_2\text{CH}_3$

b. Which of the following substances is most likely to be a gas at STP and why?

$(\text{CH}_3)_2\text{O}$ CH_4 NH_3 CH_3COOH

c. Arrange the following in the expected order of increasing melting point and explain.

NaOH CH_3OH LiOH $\text{C}_6\text{H}_5\text{OH}$