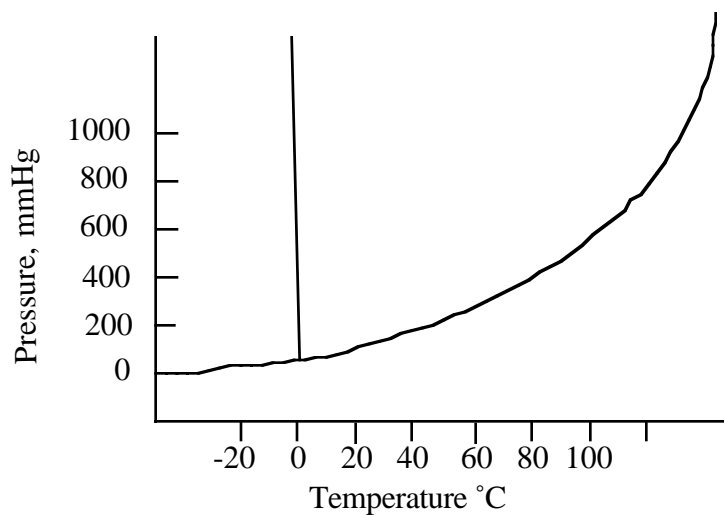


ALL work must be shown to receive full credit. **Due at the beginning of lecture on Friday, September 7, 2001.**

PS2.1. In the phase diagram for water shown below;



- a) determine the physical state of water at
 - i) 900 mmHg and 40 °C
 - ii) 500 mmHg and 30 °C
 - iii) 300 mmHg and 90 °C

- b) At 400 mm Hg what is the approximate temperature needed to convert water from a solid to a liquid?

- c) What is the approximate pressure at which water changes from a liquid to a gas at 80 °C?

PS2.2. Carbon disulfide, CS_2 , has a vapor pressure of 298 mm Hg at 20°C . A sample of 6.00 g of CS_2 , is placed into a stoppered flask at 20°C .

a) What is the maximum volume the flask can have if equilibrium is to be established between liquid and vapor?

b) If the flask has a volume of 3.0 L, what will be the pressure of CS_2 ?

c) If the flask has a volume of 6.0 L, what will be the pressure of CS_2 ?

PS2.3. Indicate all the various types of intermolecular attractive forces that may operate in each of the following:

a) $\text{C}_2\text{H}_6(l)$;

b) $\text{H}_2\text{S}(l)$;

b) $\text{CH}_3\text{NH}_2(l)$;

d) $\text{MgCl}_2(s)$

PS2.4. What is the strongest intermolecular attraction, or bond, that must be broken when each of the following substances is melted?

a) nitrogen monoxide

b) boron trifluoride

c) ammonium chloride

d) bromine

e) propane

PS2.5. Arrange the following substances in order of increasing boiling point;



Explain why you arranged the substances in the order you determined.

PS2.6. For each of the following pairs of substances predict which will have the higher boiling point and indicate why:

a) CO_2 or OCS	b) CH_3CH_2OH or $HOCH_2CH_2OH$
c) HCl or KCl	d) N_2 or Ba

PS2.9. Europium metal crystallizes in a body-centered cubic unit cell. The density of europium is $5.26 \frac{\text{g}}{\text{cm}^3}$. Calculate the edge length of the unit cell and the atomic radius of europium.

PS2.10. Aluminum crystallizes in a face-centered cubic unit cell and has a density of $2.70 \frac{\text{g}}{\text{cm}^3}$. What are the unit cell dimensions (edge length)?