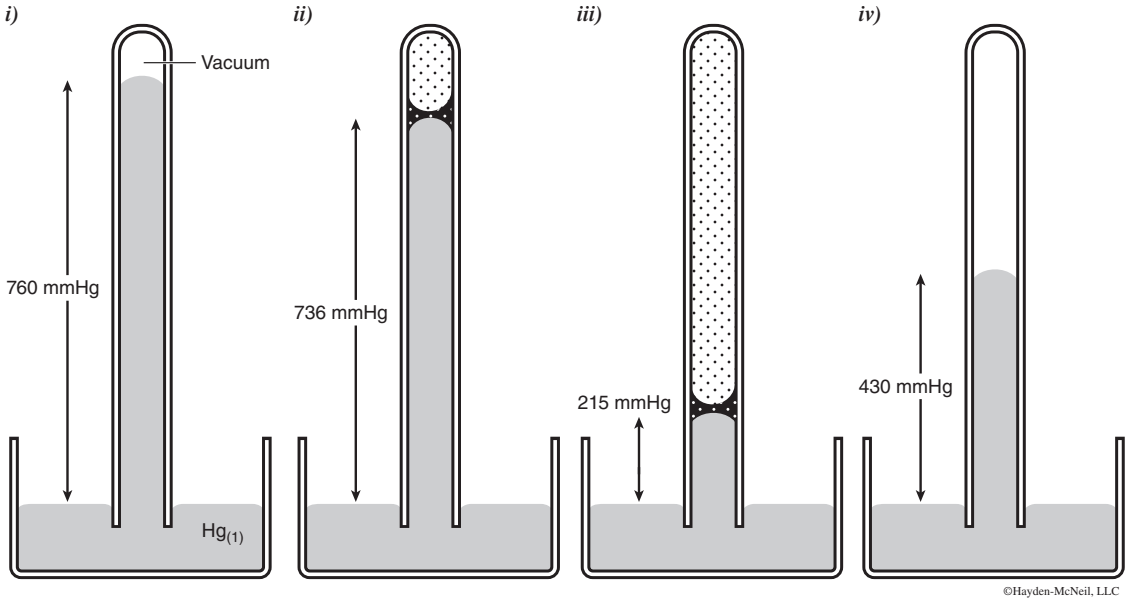
VAPOR PRESSURE

NAME SECTION

1. Consider the sketches of four barometers. Barometer i shows the measurement of atmospheric pressure. Barometer ii depicts the situation of a sample of water having been injected into the tube. Barometer iii and iv depict samples of diethyl ether having been injected into the tubes. All four barometers are at the same temperature.



   a. Why does the height of the mercury column change when liquids are injected?

   b. What is the equilibrium vapor pressure of diethyl ether?

   c. What is the pressure of the diethyl ether vapor in barometer iv?

d. Based on your answers in b and c, what mass of diethyl ether, compared to that in barometer iii, was originally injected into barometer iv? (Note: Answer *more than*, *less than*, or *the same amount as.*)

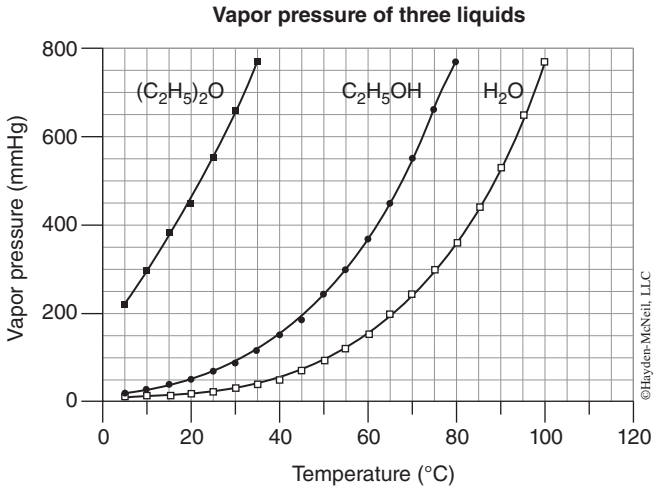
e. Complete barometer iv by carefully sketching in the space above the mercury level in the tube symbols (dots) which correctly represent the phase(s) present.

f. Using your answers for c through e, explain what happened when the sample of diethyl ether was originally injected into barometer iv.

VAPOR PRESSURE AND TEMPERATURE

NAME SECTION

1. Using the information on the graph below, explain how a change in temperature of a liquid effects its vapor pressure.



2. Write the Clausius-Clapeyron equation in the space below and define each term.

3. Given that the vapor pressure of ammonia is 164 mmHg at −56 °C, calculate the vapor pressure at −45 °C. ΔH°_{vap} = 28.0 kJ/mol.

4. Calculate the normal boiling point of ammonia knowing the vapor pressure at −38 °C is 538 mmHg. ΔH°_{vap} = 28.0 kJ/mol.

5. Using the vapor pressure data for acetic acid, $CH_3COOH(l)$,

t (˚C)	P_v (mmHg)
10.0	6.00
20.0	11.6
30.0	21.3
40.0	37.3
50.0	63.7

complete the table below and plot ln (P_v) vs. 1/T (K) on your calculator. Use your graph to estimate the heat of vaporization of acetic acid. (Note: ln is the natural log function.)

T (˚C)	T (K)	1/T (K)	P_v (mmHg)	ln (P_v)
10.0	283		6.00	
20.0	293		11.6	
30.0	303		21.3	
40.0	313		37.3	
50.0	323		63.7	

INTERMOLECULAR ATTRACTIVE FORCES

NAME _____ SECTION _____

1. Sketch the orientations of molecules and/or ions involved in the following intermolecular attractive forces. Include at least one specific example where each attractive force is important. For each one, tell what causes the force and describe its strength relative to the others.

   a. ion–dipole forces

   b. dipole–dipole forces

   c. London dispersion forces

   d. hydrogen-bonding forces

2. Complete the following table:

System	Primary Intermolecular Force	Sketch of Interaction Between Particles
$CH_2Cl_2(l)$		
$NH_3(l)$		
$SO_2(l)$		
$KBr(s)$		
$I_2(s)$		
$NaCl(aq)$		
$CH_3CH_2OH(aq)$		

SOLIDS

NAME _____ SECTION _____

1. Describe the difference between atomic, molecular, ionic, and covalent solids. Include comparisons of physical properties, such as melting points, as well as types of intermolecular forces present.

2. Define the term "unit cell" and sketch the unit cell for simple cubic, body-centered cubic, and face-centered cubic crystals.

3. Complete the following table:

Unit Cell	Number of Corner Atoms	Number of Edge Atoms	Number of Face Atoms	Number of Atoms Entirely Within the Cell	Total Number of Atoms in Unit Cell
Simple cubic					
Body-centered cubic					
Face-centered cubic					