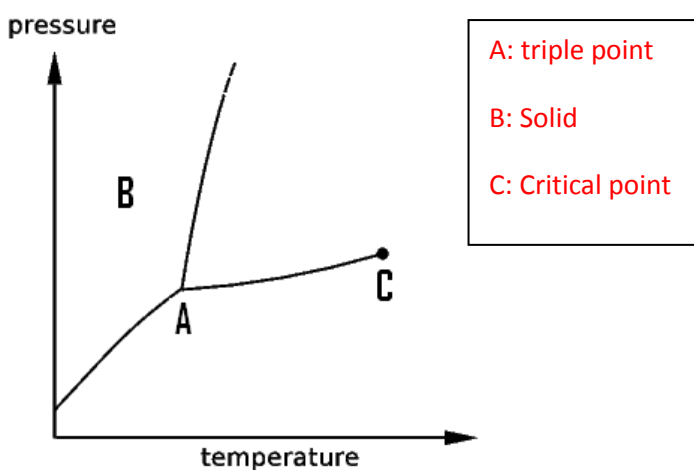


Name: KEY

Date: _____

Chem 211 – Quiz 1
Section 1

1. (3 pts) Label the lettered points on the phase diagram below.



2. (3pts) Acetone, has a $\Delta H_{\text{vap}} = 29.1 \text{ kJ/mol}$ and a normal boiling point of 56.2°C at 760 torr. At what temperature does acetone have vapor pressure of 105 torr?

$$\ln \frac{P_2}{P_1} = -\frac{\Delta H_{\text{vap}}}{R} \left(\frac{1}{T_2} - \frac{1}{T_1} \right)$$

$$\ln \frac{105 \text{ torr}}{760 \text{ torr}} = -\frac{29100 \text{ J/mol}}{8.314 \frac{\text{J}}{\text{Kmol}}} \left(\frac{1}{T_2} - \frac{1}{329.35 \text{ K}} \right)$$

$$-1.979 = -3500.12 \left(\frac{1}{T_2} - .00303 \right)$$

$$5.64 \times 10^{-4} = 1/T_2 \quad T_2 = 278 \text{ K}$$

3. (3 pts) Describe (3) characteristics that define Intramolecular forces.

Bonding forces
Occurs within a molecule
Influences chemical properties

4. (1 pt) Gas going to liquid is what physical principle?

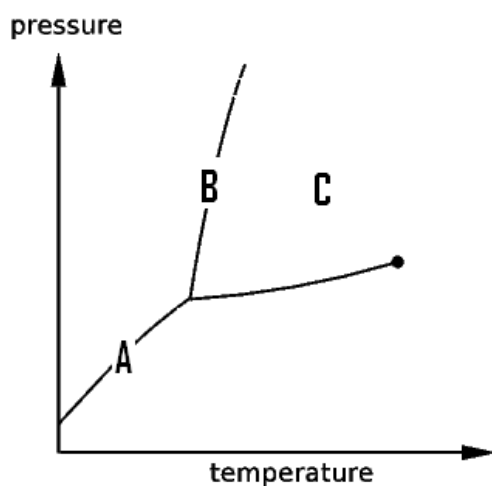
Condensation

Name: _____

Date: _____

Chem 211 – Quiz 1
Section 2

1. (3 pts) Label the lettered points on the phase diagram below.



A: Sublimation

B: Melting

C: Liquid

2. (3 pts) Describe (3) characteristics of Intermolecular forces.

Non bonding forces

Occurs between molecules

Influences physical characteristics

3. (3 pts) Water, has a $\Delta H_{\text{vap}} = 40.65 \text{ kJ/mol}$ and a normal boiling point of 100°C at 760 torr. What is the temperature of water at 950 torr?

$$\ln \frac{P_2}{P_1} = -\frac{\Delta H_{\text{vap}}}{R} \left(\frac{1}{T_2} - \frac{1}{T_1} \right)$$

$$\ln \frac{950 \text{ torr}}{760 \text{ torr}} = -\frac{40650 \text{ J/mol}}{8.314 \text{ J/Kmol}} \left(\frac{1}{T_2} - \frac{1}{373.15 \text{ K}} \right)$$

$$.22314 = -4871.3 \left(\frac{1}{T_2} - .00268 \right)$$

$$-4.58 \times 10^{-5} = 1/T_2 \quad T_2 = 350 \text{ K}$$

4. (1 pt) Solid going to gas is what physical principle?

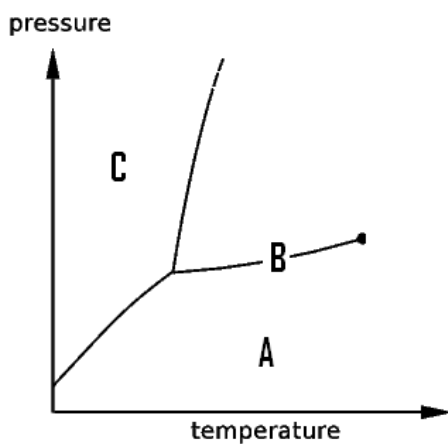
Sublimation

Name: _____

Date: _____

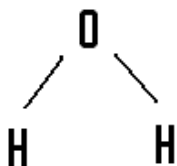
Chem 211 – Quiz 1
Section 3

1. (3 pts) Label the lettered points on the phase diagram below.



A: Gas
B: Vaporization
C: Solid

2. (3 pts) Draw an example of intramolecular forces using water.



Forces within a single molecule

3. (3 pts) Benzene, has a $\Delta H_{\text{vap}}=30.72$ kJ/mol . At 26°C the vapor pressure is 100 torr. What is the vapor pressure at 60°C?

$$\ln \frac{P_2}{P_1} = -\frac{\Delta H_{\text{vap}}}{R} \left(\frac{1}{T_2} - \frac{1}{T_1} \right)$$

$$\ln \frac{P_2}{100 \text{ torr}} = -\frac{30720 \text{ J/mol}}{8.314 \text{ J/Kmol}} \left(\frac{1}{333.15 \text{ K}} - \frac{1}{299.15 \text{ K}} \right)$$

$$\ln \frac{P_2}{100 \text{ torr}} = (-3694.97)(3.411 \times 10^{-4})$$

$$\ln \frac{P_2}{100 \text{ torr}} = 1.26 \quad P_2/100 \text{ torr} = 3.527 \quad P_2 = 353 \text{ torr}$$

4. (1 pt) Liquid going to solid is what physical principle?

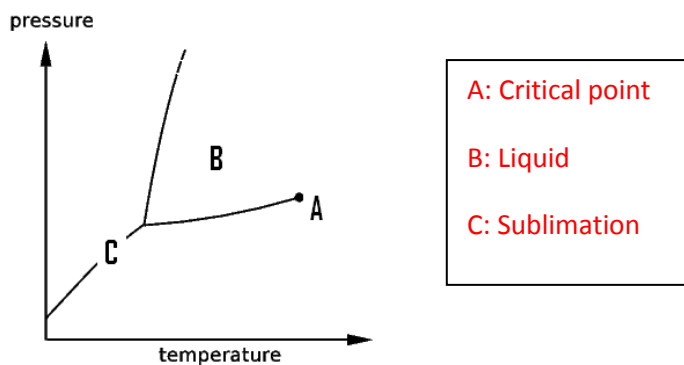
Freezing

Name: _____

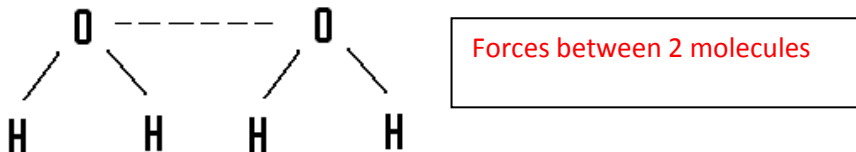
Date: _____

Chem 211 – Quiz 1
Section 4

1. (3pts) Label the lettered points on the phase diagram below.



2. (3 pts) Draw an example of intermolecular forces using water.



3. (3 pts) Ethyl acetate, has a $\Delta H_{\text{vap}} = 31.94 \text{ kJ/mol}$. At 300 torr the temperature is 51°C . Calculate the temperature at 760 torr?

$$\ln \frac{P_2}{P_1} = -\frac{\Delta H_{\text{vap}}}{R} \left(\frac{1}{T_2} - \frac{1}{T_1} \right)$$

$$\ln \frac{760 \text{ torr}}{300 \text{ torr}} = -\frac{31940 \text{ J/mol}}{8.314 \text{ J/Kmol}} \left(\frac{1}{T_2} - \frac{1}{324.15 \text{ K}} \right)$$

$$0.9295 = -3841.7 \left(\frac{1}{T_2} - .00308 \right)$$

$$-2.4195 \times 10^{-4} = \frac{1}{T_2} - .00308 \quad .002838 = 1/T_2 \quad T_2 = 352 \text{ K}$$

4. (1 pt) Solid to liquid is what physical property?

Freezing