Unit 6 Study Guide

Answer Key!

1. Define the Kinetic molecular theory (KMT)
   Particles are in constant motion

2. Describe the ***density, collisions/kinetic energy, & compressibility*** of the following:
   Solid: ↑ density, ↓ KE, ↓ compressibility

   Liquid: ↑ density, ↑ KE, ↓ compressibility

   Gas: ↓ density, ↑ KE, ↑ compressibility

3. What is the conversion for Kelvins to Celsius?
   a. 68.0°C = 341 K b. 266.6K = -6.4 °C

   68+273 = 341 266.6 - 273 = -6.4

4. What are the standards for atmospheric pressure?
   760 torr/mmHg 101.3 KPa 1 atm

5. Convert from one pressure measurement to another:
   a. 685mmHg = ____atm $\frac{685\ mmHg}{1} \times \frac{1\ atm}{760\ mmHg} = \boxed{0.901\ atm}$

   b. 21.34atm = _____kPa $\frac{21.34\ atm}{1} \times \frac{101.3\ kPa}{1\ atm} = \boxed{2161.7\ kPa}$

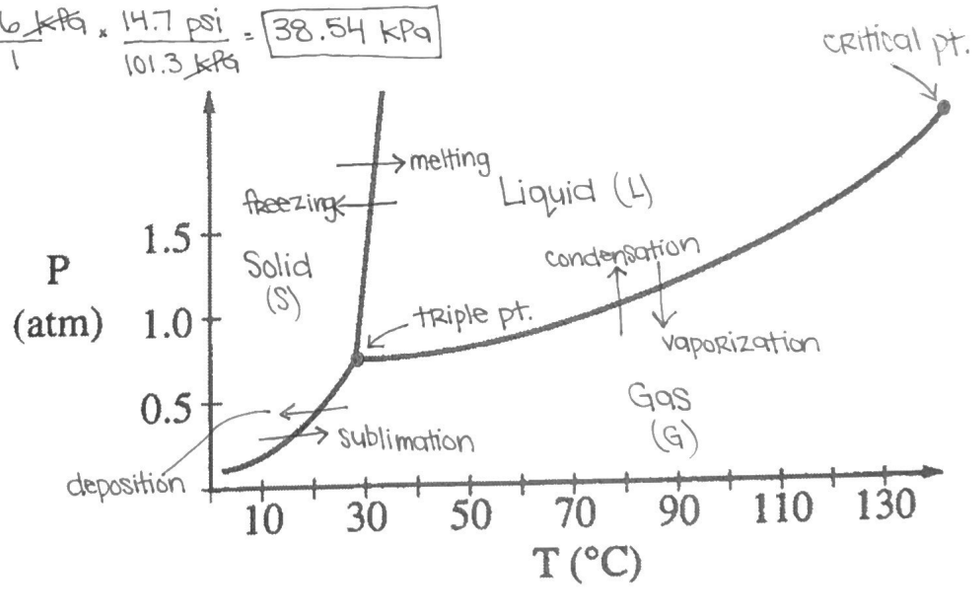
   c. 135.6kPa = _____mmHg $\frac{135.6\ kPa}{1} \times \frac{760\ mmHg}{101.3\ kPa} = \boxed{1017.3\ mmHg}$

   d. 265.6kPa = ___lbs/in^2 (psi) $\frac{265.6\ kPa}{1} \times \frac{14.7\ psi}{101.3\ kPa} = \boxed{38.54\ kPa}$

Phase diagram review:

1. Label each section with their correct phase, then color the sold part green, the liquid part blue and the gas yellow.

2. Draw arrows on the diagram below & label each arrow with: Freezing, Sublimation, Condensation, Vaporization, Melting, Deposition.



3. Label the triple point. Describe it: The pressure and temperature at which all three phases (S,L,G) exist in equilibrium

4. Label the critical point. Describe it: Exists at a critical pressure, at which point a liquid and gas are indistinguishable (i.e. cannot go back to a liquid)

5. If the pressure decreases from 1.5 to 0.5 atm at a constant temperature of 50°C, what happens?

L → G (vaporization)

6. If the temperature increases from 10°C to 50°C at a constant pressure of 0.5 atm, what happens?

S → G (sublimation)

7. If the temperature decreases from 110°C to 40°C at a constant pressure of 1.1 atm, what happens?

G → L (condensation)

8. Use the phase diagram and answer the questions:

a) When a solid changes to a liquid it is called melting, this (absorbs or releases) heat which is (Endothermic or Exothermic)

b) When a liquid changes to a solid it is called freezing, this (absorbs or releases) heat which is (Endothermic or Exothermic)

c) When a vapor changes to a liquid it is condensation, this (absorbs or releases) heat which is (Endothermic or Exothermic)

d) When a liquid changes to a vapor it is called vaporization, this (absorbs or releases) heat which is (Endothermic or Exothermic)

9. A sample of carbon dioxide occupies a volume of 3.50 L at 125 kPa. What pressure would the gas exert if the volume were decreased to 2.00 L? Assume constant Temp. (V_2, V_1, P_1)

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ $P_1V_1 = P_2V_2$ $\frac{(125\ kPa)(3.50\ L)}{2.00\ L} = \frac{(P_2)(2.00\ L)}{2.00\ L}$ $P_2 = 218.75\ kPa$

10. If the volume of a gas container is decreased, what happens to the pressure in the container? What if the volume is increased?

If V decreases, then P increases.

If V increases, then P decreases.

Boyle's Law $PV = k$ ← a constant

11. Oxygen gas is at a temperature of 40°C when it occupies a volume of 2.3 L. What temperature **in Celsius** would the gas be if the volume was 1.2L? Assume constant P. (V_1)

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ $40 + 273 = 313\ K$ (T_1) (V_2) $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ $\frac{2.3\ L}{313\ K} = \frac{1.2\ L}{T_2}$ $T_2 = 163.304\ K - 273$ $T_2 = -109.7\ °C$

12. What happens to the temperature of a gas when it is compressed?

Temp. increases.

13. What is the relationship between pressure and temperature?

Gay-Lussac $\frac{P}{T} = \text{constant}$ P & T are directly proportional. If P increases, then T increases. If P decreases, then T decreases.

14. Does all motion ever stop? If so at what temperature? Theoretically motion would stop at absolute zero (0 K).

↳ (This is 0 kelvin, not the word 'OK'.)