**Unit 2 Matter and Energy Review Worksheet Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Classify the following as elements (E) or compounds (C): **(3 x 1 pt)**

1. hydrogen peroxide **C**
2. hydrogen **E**
3. copper **E**
4. water **C**

Classify the following as pure substances (P) or mixtures (M): **(3 x 1 pt)**

1. salt water **M**
2. salad dressing **M**
3. air **M**
4. baking soda **P**

Classify the following as homogeneous (HO) or heterogeneous (HE) mixtures: **(3 x 1 pt)**

1. granite **HE**
2. Jell-O **HO**
3. Cheerios **HE**
4. Hand sanitizer solution **HO**

Classify the following as intensive (I) or extensive (E), and physical (P) or chemical (C) properties: **(3 x 2 pt)**

1. density **I P**
2. toxicity **E C**
3. boiling point **I P**
4. radioactivity **I C**

Classify the following as physical (P) or chemical (C) changes: **(3 x 1 pt)**

1. frying an egg **C**
2. icicle melting **P**
3. campfire **C**
4. filtering a mixture **P**

**(8 x 1 pt vocabulary fillin the blank using a word bank)**

1. Complete the following table of elements and elemental symbols. (4 x 1 pt)

|  |  |  |  |
| --- | --- | --- | --- |
| ElementName | Element Symbol | ElementName | Element Symbol |
| Barium | Ba | Lithium | Li |
| Tungsten | W | Chlorine | Cl |
| Germanium | Ge | Antimony | Sb |
| Krypton | Kr | Hydrogen | H |

1. What are standard temperature and pressure, STP? (2 pts) 0°C (or 273 K) 1 atm
2. State the 5 principles of the kinetic molecular theory of gases (3 pts) (2 extra credit)
3. Straight line constant speed random motion
4. Mostly empty space
5. No attractions or repulsions
6. Collisions are elastic (don’t lose energy)
7. Temperature (in K) is a measure of the kinetic energy of atomic motion. (0 K = no motion)
8. Complete the following table about describing the states of matter. (9 pts)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| State | Shape(definite/indefinite) | Volume(definite/indefinite) | Compressible/ Incompressible | Density | Atomic Motion | Sketch for Ne |
| Solid | definite | definite | incompressible | v. high | Low: only shakes | See below |
| Liquid | indefinite | definite | incompressible | high | Medium:Flows around | See below |
| Gas | indefinite | indefinite | highly compressible | v. low | High:KMT descrip | See below |



Supercritical fluid

(10 pts of questions about phase diagrams)

1. Label the Solid, Liquid, Gas and Supercritical Fluid regions on the phase diagram.
2. What are the temperature and pressure of the critical point?

T = 647 K P = 218 atm

1. What are the temperature and pressure of the triple point? T = 273.2 K P = 0.006 atm
2. What is the normal melting point? \_\_\_273 K\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What is the normal boiling point? \_\_\_\_373 K\_\_\_\_\_\_\_\_\_\_\_\_\_

1 atm = 760.0 mm Hg = 760.0 torr = 29.92 in. Hg = 14.69 psi = 101.3 kPa

1. Express a weather report in Europe as 97.8 kPa in atmospheres.

 = 0.965 atm

1. Express a weather report in Missouri as 30.05 inches Mercury in torr.

 = 763.3 torr

1. Express 128°C in Kelvin.

 401 K

1. Express 175 K in degrees Celsius.

– 98 °C

(2 x 5 pts gas law problems) For each of the following, Create a “Initial, Final, Effect chart”, Qualitatively predict the answer, Draw a diagram of the gas sample before and after the change, and calculate the answer.

1. A sample of nitrogen gas has a volume of 478 cm3 and a pressure of 104.1 kPa. What volume would the gas occupy at 88.2 kPa if the temperature remains constant? 564 L
2. 8.98 dm3 of hydrogen gas is collected at 38.8 °C. Find the volume the gas will occupy at -39.9 °C if the pressure remains constant. 6.71 dm3
3. A sample of gas has a volume of 215 cm3 at 23.5 °C and 84.6 kPa. What volume will the gas occupy at STP? 165 cm3
4. A balloon is filled with 35.0 L of helium in the morning when the temperature is 20.00 C. By noon the temperature has risen to 45.00 C. What is the new volume of the balloon? 38.0 L
5. A helium balloon with an internal pressure of 1.00 atm and a volume of 4.50 L at 20.00 C is released. What volume will the balloon occupy at an altitude where the pressure is 0.600 atm and the temperature is –20.00 C? 6.48 L
6. A gas occupies 12.3 L at 825.7 mmHg. What will the pressure be when the volume is 75 L? **135 mmHg**
7. A gas has a pressure of 6.58 kPa at 540 K. What will the pressure be at 210 K if the volume does not change? **2.56 kPa**

(2 x 5 pts heat problems)

1. What is the identity of a metal if a 25.0 g sample releases 250.0 J of heat when it cools from 68°C to 25°C?

1. What mass of iron can be heated from 25C to 100C with the addition of 875 J of heat?

1. What will be the final temperature of a 365 g sample of water initially at 20.0C after the addition of 640 J of heat?

1. How much heat is needed to raised 30.0 g of water initially at 0.0C to body temperature of 37.0C?