

## Honors Chemistry – Unit 5 Review

### Chapter 13 – States of Matter

#### Vocabulary – Use with Questions 1-16

normal boiling point	unit cell	crystal	melting point
Avogadro's hypothesis	vaporization	amorphous	phase change
atmospheric pressure	boiling point	barometer	sublimation
vapor pressure	super-cooled liquid	kinetic theory	evaporation

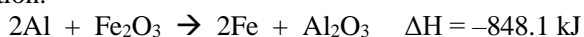
- \_\_\_\_\_ states that equal volumes of gases at the same temperature and pressure contain equal numbers of particles.
- A \_\_\_\_\_ is a device used to measure atmospheric pressure.
- \_\_\_\_\_ is the temperature at which a solid turns into liquid.
- A \_\_\_\_\_ is a substance that has cooled to a rigid state without crystallizing.
- The pressure resulting from the collision of air molecules with objects is called \_\_\_\_\_.
- The temperature at which the vapor pressure of a liquid is just equal to the external pressure is called \_\_\_\_\_.
- \_\_\_\_\_ is a form of solid lacking an ordered internal structure.
- A \_\_\_\_\_ is a solid in which the atoms, ions, or molecules are arranged in an orderly pattern.
- The pressure above a liquid in a sealed container caused by collision of vaporized particles with the walls of the container is called \_\_\_\_\_.
- The smallest group of particles within a crystal that retains the shape of the crystal is called the \_\_\_\_\_.
- \_\_\_\_\_ is the boiling point of a liquid at a pressure of 1 atm.
- A change that occurs when the physical state of a substance changes is called a \_\_\_\_\_.
- The evaporation of an uncontained liquid is called \_\_\_\_\_.
- The \_\_\_\_\_ states that tiny particles in all forms of matter are in constant motion.
- The conversion of a liquid to a gas below the boiling point is called \_\_\_\_\_.
- The direct change of a substance from a solid to a gas is called \_\_\_\_\_.

#### Concepts

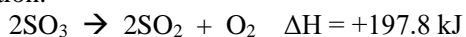
- Most solids...
  - are dense and incompressible
  - have low melting points
  - are amorphous in nature
  - consist of particles in random motion
- The escape of gas molecules from the surface of an uncontained liquid is known as:
  - boiling
  - sublimation
  - evaporation
  - condensation
- The pressure of a gas in a container is 152 mm Hg. This is equivalent to:
  - 0.2 atm
  - 2 atm
  - 0.3 atm
  - 0.4 atm
- Standard conditions when working with gases are defined as:
  - 0 K and 1 atm
  - 0 K and 1 mmHg
  - 0°C and 1 atm
  - 0°C and 1 mm Hg
- The temperature at which the motion of particles theoretically ceases is:
  - 273 K
  - 0 K
  - 0°C
  - 273°C
- The average kinetic energy of the particles of a substance is:
  - not affected by the temperature of the substance
  - raised as the temperature of the substance is lowered
  - proportional to the temperature of the substance
  - equal to the total thermal energy absorbed by the substance

## Chapter 17 – Thermochemistry

- Convert from one unit to the other:
  - 1.69 Joules to calories
  - 820.1 J to kilocalories
  - 68 calories to kilocalories
  - 20.0 calories to Joules
- Determine the energy required (in Joules) when the temperature of 3.21 grams of water increases by 4.0 °C while remaining liquid.
- Determine the energy required (in kilojoules) when cooling 456.2 grams of water at 89.2 °C to a final temperature of 5.9 °C.
- Determine the energy required to boil 0.345 moles of water at 100.0 °C.
- Determine the energy required to melt 74.5 grams of ice at 0.0 °C.
- Determine the specific heat of a 150.0 gram object that requires 62.0 cal of energy to raise its temperature 12.0 °C.
- When 80.0 grams of a certain metal at 90.0 °C was mixed with 100.0 grams of water at 30.0°C, the final equilibrium temperature of the mixture was 36.0 °C. What is the specific heat (J/ g°C) of the metal?
- A piece of aluminum with a mass of 80.0 g at a temperature of 70.0°C is dropped into an insulated container, which contains 250.0 mL water. The temperature of the water before adding the aluminum is 25.0°C. The final temperature of the mixture is 28.5°C What is the specific heat capacity of the aluminum?
- How much energy is required to convert 100.0 g of water at 20.0 °C completely to steam at 100.0 °C?
- Calculate the energy released when 10.0 g of steam at 120.0 °C are converted into ice at the -20.0 °C.
- Given the following reaction:



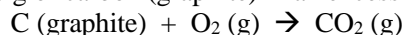
- Is the reaction endothermic or exothermic?
  - Write the thermochemical equation.
  - You have 22.7 g of iron (III) oxide. How much heat is released when the iron (III) oxide reacts with excess aluminum?
  - How many grams of iron are produced when 224.3 kJ of energy are released?
- Given the following reaction:



- Is the reaction endothermic or exothermic?
  - Write the thermochemical equation.
  - How many grams of SO<sub>3</sub> react when 575 kJ of heat is absorbed?
- How much heat energy is released when 12.8 g of barium oxide react with excess sulfur trioxide?

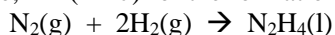


- You can find the amount of heat evolved in the combustion of carbon by carrying out the reaction in a combustion calorimeter. You burn 0.300 g of carbon (graphite) in an excess of O<sub>2</sub> (g) to give CO<sub>2</sub> (g).



The temperature of the calorimeter, which contains 775 g of water, increases from 25.0°C to 27.38°C. What quantity of heat is evolved per mole of carbon?

- What is the enthalpy change,  $\Delta H$  (in kJ) for the formation of hydrazine, N<sub>2</sub>H<sub>4</sub>(l), from its elements?



Use the following data:

