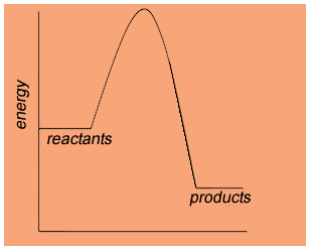
AP Worksheet 6b (Enthalpy)

1. Consider the reaction for the formation of ***one mole*** of aluminum oxide.
   a. There are two ways to write a balanced thermochemical equation (including ΔH). Show both ways for the formation of this compound.
   ΔH as reactant/product
   ΔH separate from equation

   b. Is this process endothermic or exothermic?

   c. Construct a heat-content diagram (reaction profile) for this reaction.

   Reactants
   ↓
   Products



2. Suppose a 7.40-gram sample of ammonium nitrate salt is dissolved in a calorimeter containing 100. mL of water at 24.2 °C. The dissolving of the salt caused the water temperature to drop to 18.4 °C.
   a. Write the net-ionic dissociation equation for the dissolving of this salt.
   solid to two aqueous ions

   b. Is the dissolving of ammonium nitrate and exothermic or endothermic process?

   c. How many moles of ammonium nitrate dissolved?

   0.0924 mol

   d. Calculate the ΔH (in kJ/mol) for this process.

   28.1 kJ/mol

3. Consider the following reaction:

$$2NO(g) \rightarrow N_2(g) + O_2(g) \qquad \Delta H = -180.5 \text{ kJ}$$

   a. How much energy would be released if 15.0 grams of $N_2(g)$ were formed?

   -96.6 kJ

   b. How many molecules of $NO(g)$ were consumed if 250. kJ of energy was released?
   1.67×10^{24} molec

over, please

c. How many grams of $O_2(g)$ were produced if 250. kJ were released?

44.3 g

4. How much energy is released when 152 grams of water at a temperature of 85 °C is cooled to 0.°C and subsequently frozen?

For water,
heat of fusion = 6.02 kJ/mol
heat of vaporization = 40.7 kJ/mol
specific heat = 4.18 J/g °C

-104.9 kJ

5. Explain why steam at 100 °C is more dangerous than an equal amount of boiling water at the same temperature (100 °C).

Answer

6. Sketch a ***cooling*** curve for sea-level water vapor nvv. Be sure to do the following:
   - Properly label the axes.
   - Identify the condensation and freezing points on the vertical axis.
   - Identify what state(s) of matter are in existence on the horizontal axis.
   - Identify the areas of changing kinetic and potential energy on the curve.

Answer