• AP Chemistry

Name_____
Period __ Date __/__/__

6 • Energy and Chemical Reactions

INTRO TO ENERGY

When we write an equation, there is usually **energy** involved. Consider the evaporation of water:

$$H_2O(l) + \text{energy} \rightarrow H_2O(g)$$

This energy is called **the heat of vaporization** with the symbol, $\Delta\mathbf{H_{vap}}$. The Δ means "change". Energy is measured in Joules (J) or kiloJoules (kJ). The equation represents **one mole** of water being vaporized, so the energy is called the **molar heat of vaporization** and is reported in **kJ/mol**.

Write an equation for the following changes:

a) The melting of ice:

b) The condensation of steam:

c) The sublimation of dry ice, $CO_2(s)$:

d) The freezing of liquid water:

If energy is **absorbed** during a chemical or physical change, the reaction is called **endothermic**. Which equation(s) above represent ***endothermic*** changes? _____ (a, b, c, d)

If energy is **released** during a chemical or physical change, the reaction is called **exothermic**.

The energy to **melt** a mole of ice is called the **molar heat of fusion**, ΔH_{fus}.
When 1.00 gram of $H_2O(s)$ melts, 334.6 Joules of energy is absorbed. Calculate the amount of energy required to melt 1.00 mole of ice. This is the molar heat of fusion for H_2O. _____kJ/mol

The ΔH_{fus} can, of course, be used as a conversion factor.

Calculate the amount of heat needed to melt 35.2 grams of ice. Show your work as a single line equation.

What mass of ice can be melted with 975 J of energy? Show your work as a single line equation.

PRACTICE: Show all work as single line equations:

The accepted value of the heat of fusion of water, ΔH_{fus}, is 6.03 kJ/mol.
The accepted value of the heat of vaporization of water, ΔH_{vap}, is 40.67 kJ/mol.

1. Calculate the amount of heat energy needed to boil 40.0 grams of water.

2. What mass of water can be vaporized with 55.0 kJ of energy.

3. How much heat is needed to vaporize 1.00 gram of H_2O?

4. 100. grams of steam condenses to liquid water. What amount of energy is released?

5. 775 J of energy is added to liquid water at 100°C. What mass of water is vaporized?