CHEM 1100 Dr. Stone Spring 2014 More Practice for Quiz 12 Name_____

Specific Heat Capacity / Molar Heat Capacity

- Specific heat capacity is the amount of heat energy (q) required to raise the temperature of one gram of a substance by 1 °C.
- Molar heat capacity is the amount of heat energy (q) required to raise the temperature of one mole of a substance by 1 °C.

$$\text{heat capacity} = c = \frac{q}{(m)(\Delta T)}\ , \text{units} = \frac{J}{g \cdot °C} \text{ or } J \cdot g^{-1} \cdot °C^{-1}$$

$$\text{molar heat capacity} = c_m = (c)(\text{molecular weight})\ , \text{units} = \frac{J}{mol \cdot °C} \text{ or } J \cdot mol^{-1} \cdot °C^{-1}$$

Energy

$\Delta E = q + w$, where ΔE is the change in energy, q = heat, w = work

- Be able to solve for any of these variables.
- Energy, heat, or work, done on, or put into the system is a positive (+) sign.
- Energy or heat that leaves the system, or if the system does work on the surroundings, is a negative (-) sign.
- Must get the sign correct!

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1. Calculate the net energy change (in kJ per mole) that occurs when lithium iodide forms from the elements. Show your work to get any credit.

$Li(s) + 1/2Cl_2(g) \text{ ---> } LiCl(s)$

Enthalpy of sublimation for Li	159 kJ/mole
Bond dissociation energy for Cl_2	243 kJ/mole
Lattice energy for LiCl	853 kJ/mole
Electron affinity for Cl	-349 kJ/mole
First ionization energy for Li	520 kJ/mole

2. The specific heat of copper is 0.385 (J/g°C). A piece of copper weighs 21.3 grams and starts out at 25°C. It then absorbs 2.312 kJ of energy. What is the new temperature of the piece of copper? Show your work to get any credit.

3. . Calculate D*E* and indicate whether the internal energy of the system has increased or decreased in the following cases.

a) A system absorbs 130J of heat and does 150.0 kJ of work.
D*E* = _____
E_{system} has increased or decreased (circle one)

b) q = -4.2 kJ and w = -650 J
D*E* = _____
E_{system} has increased or decreased (circle one)