Unit 3 Worksheet 5 – Quantitative Energy Problems
Phase Changes

Energy constants (for Water)

334 J/g   Heat of fusion (melting or freezing) H_f

2260 J/g   Heat of vaporization (evaporating or condensing) H_v

For each of the problems:
a) Sketch a **warming or cooling curve** to help you decide which heat capacity constant to use to solve the problem. Identify the system by drawing an **energy flow diagram**.
b) Solve the problem. **Show your set-up with clearly labeled units throughout**! Keep a reasonable number of sig figs in your answers.

1. Suppose during volleyball practice, you lost 0.91 kg of water due to sweating. If all of this water evaporated, how much energy did the water absorb from your body? Express your answer in kJ.

2. A 12oz can of soft drink (assume m = 340. g) already at 0.0˚C is placed in a freezer. How much energy must be removed from the soft drink for it to completely freeze?

3. Suppose in the Icy Hot lab that the burner transfers 325 kJ of energy to the sample of liquid water at 100.˚C. What mass of the water would be boiled away?

4. A glass of ice cold lemonade is placed on a table. After a few minutes, you noticed droplets of water on the **outside** of the glass. What is the mass of water that condensed onto the glass if 1500 J of energy were removed from the water vapor surrounding the glass?

5. Suppose a bag full of ice (450. g) at 0.0 ˚C sits on the counter and begins to melt to liquid water. How much energy, in kJ, must be absorbed by the ice if 2/3 of it melted?

6. Ethyl alcohol has a heat of vaporization of 871 J/g. If a bottle of ethyl alcohol is left uncapped in the lab, what mass of it will evaporate if 10.2 kJ of energy are absorbed?