

## Heat Problems PART 1

Use the following information to answer the questions as needed

Heat capacity of water: 1 cal/gC

ice: 0.5 cal/gC

steam: 0.5 cal/gC

Heat of fusion: 80 cal/g

Heat of vaporization: 540 cal/g

1. How much heat is required to change a 15 gram piece of ice at -20C to water at 5 C?

A: 1425 Cal

2. What quantity of heat is needed to change 50 g of water from 25 C completely to steam?

A: 30,750 Cal

3. Which of the following would you expect to be a larger number: heat of fusion or heat of vaporization? Why?

4. A piece of metal at 100 C is placed in 75 grams of water at 25 C. The water temp. raises to 30 C. Assuming that the  $C_p$  of the metal is .2 cal/gC, what is the mass of the metal? (heat gained = heat lost)

A: 26.7 g

5. 50.0 grams of water are raised from 20.0 to 35.0 C when a 5 gram potato chip is burned under the can. How many calories per gram are in the chip?

A: 150 cal/g

6. Substance X has a boiling point of 60.0 C and a freezing point of 40.0 C. Given that substance X has a heat capacity of **.35** cal/gC, **.55** cal/gC, and **.25** cal/gC in the solid, liquid and gaseous states of matter, how many calories of energy would be necessary to raise the temperature of 15 grams of substance X from 25 C to 80.0 C? Substance X has a heat of fusion of **40.0** cal/g and a heat of vaporization of **275** cal/g.

A: 5043 Cal

## Heat Problems PART 2

Cp of water: 1 cal/gC ice: 0.5 cal/gC steam: 0.5 cal/gC  
Heat of fusion: 80 cal/g Heat of vaporization: 540 cal/g

1. Use the following lab data to calculate an experimental heat of fusion for water.

mass of cup -----1.5  
mass of cup and water-----150 g  
mass of cup water and ice-----165 g  
initial temperature of tap water----25 C  
final temperature of water and ice-13 C

2. Substance A has a very high vapor pressure. Make and defend a statement about the type of molecular polarity likely to be found in substance A.

3. A Snickers bar contains about 250 kilocalories of energy. How many Snickers bars would you need to completely vaporize a two liter bottle of soda? Assume the soda is at 10 C in your refrigerator, and that the heat capacities, Hv, etc. are the same as water.

4. An ice cube which has been sitting on your kitchen counter for a few minutes is placed in your dog's dish which contains 2500.0 grams of water at 27.0 C on a warm day. After the ice melts in your dog's extremely well insulated dog bowl, you note that the temp. of the water in the bowl had dropped to 18.0 C. What was the mass of the ice cube?