#9-2
CHEMISTRY
ENERGY AND SPECIFIC HEAT

$$q = m * \Delta T * c$$
$$1 Cal = 1000 \text{ cal}$$
$$1 cal = 4.18 J$$

Review

1. Suppose you throw a tennis ball up in the air. Does the kinetic energy of the ball increase or decrease as it moves higher? Explain. *Energy is conserved, it simply changes forms, from kinetic to stored potential*

2. Define: calorie *— amount of energy needed to raise 1 g of water 1°C.*

3. What is the difference between a commercial calorie and a standard calorie? *1 Commercial Calorie (Cal) = 1000 c (chemical calories)*

4. Convert 255.0 Cal to _____ cal
   $255.0 \cdot \dfrac{1000}{1} = 255000.$ or $2.550E5$ cal

5. Convert 232. Cal to _____ KJ $232 Cal \cdot \dfrac{1000 \, cal}{1 \, Cal} \cdot \dfrac{4.18 \, J}{1 \, cal} = \boxed{9.70 E 5 J}$

6. If a 10g block of Aluminum increases 10°C how much energy did it gain? (0.9J/gC)
   $q = m \cdot \Delta T \cdot C$ $10 \cdot 0.9 \cdot 10 = \boxed{90.0 J}$

7. If a 10g block of Copper gained the same energy as in the previous problem what will be the change in temperature? (0.36J/gC)
   $90.0 J = 0.368 \cdot \Delta T \cdot 10.0$ $\boxed{\Delta T = 24.5°C}$

8. If a 10g block of ice gained the same energy as in the previous problem what will be the change in temperature? (2.05J/gC)
   $90.0 = 10.0 \cdot 2.05 \cdot \Delta T$ $\boxed{\Delta T = 4.39°C}$

9. A 10 gram sample of water at 25°C gains 25J of energy. What is the final temperature? (4.18J/g °C)
   $90 J = 10 \cdot \Delta T \cdot 4.18 = \Delta T = 2.15°C$ $25 + 2.15 = \boxed{27.15}$

10. What can you say about the specific heat of water and other substances? *Very high — KJ*

11. A sample of water gained 10 kcal of energy causing the temperature to change from 25°C to 30°C. What is the mass of the water? (use 1 for specific heat)
    $q = m \cdot \Delta T \cdot C$ $10000 J = X \cdot 4.18 \cdot 5$
    $\boxed{4.78 \, g}$

12. A 150g sample of an unusual substance absorbed 3800J of energy and only changed 2 degrees. What is the specific heat?
    $q = m \cdot C \cdot \Delta T$ $3300 J = 150 \cdot C \cdot 2.0$
    $= 11. \, J/g°C$

13. If a 100°C aluminum block (mass of 250g) is dropped into 100 grams of water. The block drops to 29°C. How much energy did the block lose and how much energy did the water gain?
    $q = m \cdot \Delta T \cdot C$
    $q = 250 \cdot (100 - 29) \cdot 0.90$
    (71)
    $q = 15975 J$ $\boxed{16000 J}$