Did not use Sig figs

Heat Test Review

1. How many calories are needed to heat water to 73.0 °C if you use 205 mL of cold water at 18.0 °C

11,275 cal

2. How much heat in Joules is needed to raise the temperature of a 45.78 gram piece of aluminum from 14.0 °C to 68.0 °C? Chart page 509

2245 J
2250 J

3. What will *the final temperature* be if 3875 joules of heat is *absorbed* by 194 mL of water at 35.7 °C?

4.18

40.5°C

4. A piece of unknown metal weighing 67.56 grams and heated to 85.5 °C is placed in 195 mL of cold water at 15.0 °C. The final temperature of the mixture is 21.0 °C. What is the specific heat of the metal? (J/g°C)

$(67.56g)(64.5)C_p = (195)(6)(4.18)$ $C_p = 1.12 J/g°C$

5. How much energy is involved when 56.7 grams of water at 0.0 °C is changed to ice ? Chart page 522

$18.9kJ = (56.7g)\left|\frac{1mol}{18g}\right|\frac{6.01kJ}{1mol}$

6. ~~A piece of Aluminum with a mass of 31.45 g is heated to 90.0 °C . The hot metal is then placed in 110.0 g of water at 21.0 °C . What is the final temperature of the system? (Hint: use X for FT) Chart page 509~~

$(31.45g)(90-x)(.9J/gC) = (x-21)(110g)(4.18)$

$2549 - 28.3x = 459.8x - 9655$

$12205 = 488x$

$x = 25°C$

7. What is the amount of heat (J) required to raise the temperature of 145.67 g of iron by 10°C? Chart page 509

$J = (145.67g)(10°C)(.46) = 670.15$

8. Calculate the energy required to produce 7.00 mol HCl on the basis of the following balanced equation.

$Cl_2(g) + H_2(g) + \rightarrow 2\ HCl + 167.2\ kCal$

$7.00mol\ HCl \left|\frac{167.2kCal}{2mol\ HCl}\right. = \rightarrow$ 585.2kCal

9. When 10 g of ammonia (NH_3) is converted to vapor at its boiling point, about how much heat is absorbed? Chart page 522

$10g\left|\frac{1mol}{17g}\right|\frac{23.4kJ}{1mol} = 13.8kJ$

10. Hess's Law problem:

Calculate ΔH for the reaction $CH_4(g) + NH_3(g) \rightarrow HCN(g) + 3\ H_2(g)$, from the reactions.

$\frac{1}{2}$ R $N_2(g) + 3\ H_2(g) \rightarrow 2\ NH_3(g)$ ΔH = -91.8 kJ

R $C(s, graphite) + 2\ H_2(g) \rightarrow CH_4(g)$ ΔH = -74.9 kJ/mole

$\frac{1}{2}$ $H_2(g) + 2\ C(s, graphite) + N_2(g) \rightarrow 2\ HCN(g)$ ΔH = +270.3 kJ

45.9 kJ
74.9 kJ
135.15 kJ

256 kJ

Some definitions of key terms in the chapter.