

Heat Test Review

Did not use Sig figs

10

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

$$11,275 \text{ cal}$$

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

$$2245 \text{ J}$$

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

$$4.78$$

$$40.5^\circ\text{C}$$

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)

$$(67.56 \text{ g})(64.5^\circ\text{C}) C_p = (195 \text{ g})(6^\circ\text{C})(4.18)$$

$$C_p = 1.12 \text{ J/g}^\circ\text{C}$$

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

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

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

$$(31.45 \text{ g})(90 - x)(.9 \text{ J/g}^\circ\text{C}) = (x - 21)(110 \text{ g})(4.18)$$

$$2549 - 28.3x = 459.9x - 9655.8$$

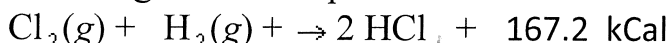
$$12205 = 468x$$

$$x = 25^\circ\text{C}$$

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

$$J = (145.67 \text{ g})(10^\circ\text{C})(.46) = 670.15$$

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



$$7.00 \text{ mol HCl} \times \frac{167.2 \text{ kCal}}{2 \text{ mol HCl}} = 585.2 \text{ kCal}$$

$$585.2 \text{ kCal}$$

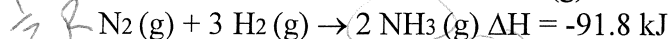
9 When 10 g of ammonia (NH₃) is converted to vapor at its boiling point, about how much heat is absorbed? Chart page 522

$$10 \text{ g} \times \frac{1 \text{ mol}}{17 \text{ g}} \times 23.46 \text{ kJ/mol} = 13.8 \text{ kJ}$$

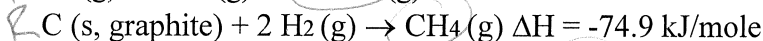
$$13.8 \text{ kJ}$$

10 Hess's Law problem:

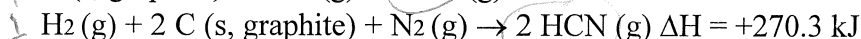
Calculate ΔH for the reaction $\text{CH}_4(\text{g}) + \text{NH}_3(\text{g}) \rightarrow \text{HCN}(\text{g}) + 3 \text{H}_2(\text{g})$, from the reactions.



$$45.9 \text{ kJ}$$



$$74.9 \text{ kJ}$$



$$135.15 \text{ kJ}$$

Some definitions of key terms in the chapter.

$$256 \text{ kJ}$$