Name: _____ Class: _____ Date: _____

1. For each variable in the heat equation ($q = ms\Delta T$):
   (a) define the variable
   (b) give the standard units for the variable

Answer the following questions. Show work for full credit. Make sure your answer has the proper number of SF and proper units.

2. How much heat energy (in KJ) is required to raise the temperature of 220. grams of Ethyl Chloride from 12.5 °C to 34.3 °C? 2. _____

3. How much heat energy (in fJ) is required to raise the temperature of 340 dag of Fe from 83.2 °C to 93.3 °C? 3. _____

4. What is the specific heat(in J/g°C) of an unknown compound if it takes 120 J to raise 180. g of the unknown from 46.2 °C to 51.4 °C? 4. _____

5. How much heat energy (in J) is required to raise the temperature of 800. grams of Ethyl Ether from 11.6 °C to 14.1 °C? 5. _____

6. How much heat energy (in J) is required to raise the temperature of 100. Tg of Brass from 68.9 °C to 71.8 °C? 6. _____

7. Convert 3.58 mols of SnN_2 to grams of SnN_2 7. _____

8. Convert $6.54x10^{23}$ of molecules of C_5O to grams of C_5O 8. _____

9. Convert 4.28 ng of $AlPO_4$ to mols of $AlPO_4$ 9. _____

10. Convert 3.37 grams of $Cu(IO_2)_5$ to molecules of $Cu(IO_2)_5$ 10. _____

11. Convert 6.8 mL of Pb to mols of Pb 11. _____

12. Convert 0.09 grams of $HC_2H_3O_2$ to mols of $HC_2H_3O_2$ 12. _____

Question 1: q = heat (J) m = mass (g) s = specific heat ($\frac{J}{g°C}$) ΔT = change in temperature ($T_{final} - T_{initial}$) ($°C$)

Question 2:

$$\frac{220.\ g}{} \times \frac{1.687\ J}{g°C} \times \frac{(34.3 - 12.5)\ °C}{} \times \frac{1\ kJ}{1000\ J} = \begin{array}{c} 8.09\ kJ \\ or\ 8.09x10^{0}\ kJ \end{array}$$

Question 3:

$$\frac{340\ g}{} \times \frac{1x10^{1}\ g}{1\ dag} \times \frac{0.473\ J}{g°C} \times \frac{(93.3 - 83.2)\ °C}{} \times \frac{1\ fJ}{1x10^{-15}\ J} = \begin{array}{c} 16,000,000,000,000,000,000\ fJ \\ or\ 1.6x10^{19}\ fJ \end{array}$$

Question 4:

$$\frac{120\ J}{} \times \frac{1}{180.\ g} \times \frac{1}{(51.4 - 46.2)\ °C} = \begin{array}{c} 0.13\ J/g°C \\ or\ 1.3x10^{-1}\ J/g°C \end{array}$$

Question 5:

$$\frac{800.\ g}{} \times \frac{2.22\ J}{g°C} \times \frac{(14.1 - 11.6)\ °C}{} = \begin{array}{c} 4,400\ J \\ or\ 4.4x10^{3}\ J \end{array}$$

Question 6:

$$\frac{100.\ g}{} \times \frac{1x10^{12}\ g}{1\ Tg} \times \frac{0.38\ J}{g°C} \times \frac{(71.8 - 68.9)\ °C}{} = \begin{array}{c} 110,000,000,000,000\ J \\ or\ 1.1x10^{14}\ J \end{array}$$

Question 7:

$$\frac{3.58\ mol\ SnN_2}{} \times \frac{146.73\ g\ SnN_2}{1\ mol\ SnN_2} = \begin{array}{c} 525\ grams\ SnN_2 \\ 5.25x10^{2}\ grams\ SnN_2 \end{array}$$

Question 8:

$$\frac{6.54x10^{23}\ molecules\ C_5O}{} \times \frac{1\ mol\ C_5O}{6.02 \times 10^{23} molecules} = \begin{array}{c} 8.26x10^{1}\ g\ C_5O \\ 8.26x10^{1}\ g\ C_5O \end{array}$$

Question 9:

$$\frac{4.28\ ng\ AlPO_4}{} \times \frac{1x10^{-9}\ g}{1\ ng} \times \frac{1\ mol\ AlPO_4}{121.92\ g\ AlPO_4} = \begin{array}{c} 0.0000000000351\ mols\ AlPO_4 \\ 3.51x10^{-11}\ mols\ AlPO_4 \end{array}$$

Question 10:

$$\frac{3.37\ g\ Cu(IO_2)_5}{} \times \frac{1\ mol\ Cu(IO_2)_5}{858.10\ g\ Cu(IO_2)_5} \times \frac{6.02 \times 10^{23} molecules}{1\ mol\ Cu(IO_2)_5} = \begin{array}{c} 2,360,000,000,000,000,000,000\ molecules\ Cu(IO_2)_5 \\ 2.36x10^{21}\ molecules\ Cu(IO_2)_5 \end{array}$$

Question 11:

$$\frac{6.8\ mL\ Pb}{} \times \frac{11.34\ g\ Pb}{1\ mL\ Pb} \times \frac{1\ mol\ Pb}{269.95\ g\ Pb} = \begin{array}{c} 0.29\ mols\ Pb \\ 2.9x10^{-1}\ mols\ Pb \end{array}$$

Question 12:

$$\frac{0.09\ g\ HC_2H_3O_2}{} \times \frac{1\ mol\ HC_2H_3O_2}{60.052\ g\ HC_2H_3O_2} = \begin{array}{c} 0.001\ mols\ HC_2H_3O_2 \\ 1.x10^{-3}\ mols\ HC_2H_3O_2 \end{array}$$