WORKSHEET#3, CHEM001
(Chapters 2 and 4)

Name: Answer Key **Date: Thursday, September 25th, 2019**

1) Write the following numbers reduced to 3 significant figures. How many sig figs did each number have originally? What was the original precision of each number?

Number	# of sig figs	Precision	Reduced to 3 sig figs
0.0275	3	10,000THS	0.0275
4032	4	UNITY	4.03×10^3
6500.00	6	100THS	6.50×10^3
1000.	4	UNITY	1.00×10^3
728700	4	100s	7.29×10^5

2) Convert the following temperatures, in Fahrenheit, to Kelvin: 300℉, 220℉, 10.0℉, 300.℉.

300°F − 32 = 268 → 300
300/1.8 = 166.$\overline{66}$ → 200°C
200°C + 273.15 = 475.15 → 500 K

10.0°F − 32 = −22.0
−22.0/1.8 = −12.2$\overline{2}$ → −12.2°C
−12.2°C + 273.15 = 261 K

300. °F − 32 = 268.
268/1.8 = 148.88 → 149°C
149°C + 273.15 = 422 K

220°F − 32 = 188 → 190
190/1.8 = 105.5$\overline{5}$ → 110°C
110°C + 273.15 = 383.15 → 3.8×10^2 K

4.16) How many joules of heat are required to heat 65 g of lead from 22.0 degrees C to 98.5 degrees C?

$\boxed{6.4 \times 10^2 \text{ J}}$

640 J

4.20) A 275-g sample of a metal requires 10.75 kJ to change its temperature from 21.2 degrees C to its melting temperature, 327.5 degrees C. What is the specific heat of this metal?

$$10.75 \text{ kJ} \times \frac{1000 \text{ J}}{1 \text{ kJ}} = 1.075 \times 10^1 \text{ kJ} \times \frac{10^3 \text{ J}}{1 \text{ kJ}} = 1.075 \times 10^4 \text{ J}$$

$$1.075 \times 10^4 \text{ J} = (275 \text{ g})(c)(327.5 - 21.2 \text{ °C})$$

$$\parallel$$

$$10.75 \times 10^3 \text{ J}$$

$$c = 0.1276 \text{ J/g °C}$$

$\boxed{0.128 \text{ J/g °C}}$

4.22) A 225-g sample of aluminum was heated to 125.5 degrees C, then placed into 500.0 g water at 22.5 degrees C. Calculate the final temperature of the mixture.

$$-q_{Al} = +q_{H_2O}$$

$\cancel{\boxed{31.7 \text{ °C}}}$ $\boxed{31.6 \text{ °C}}$

$$-m_{Al} C_{Al} (T_F - T_{I,Al}) = +m_{H_2O} C_{H_2O} (T_F - T_{I,H_2O})$$

$$-m_{Al} C_{Al} T_F + m_{Al} C_{Al} T_{I,Al} = m_{H_2O} C_{H_2O} T_F - m_{H_2O} C_{H_2O} T_{I,H_2O}$$

$$m_{Al} C_{Al} T_{I,Al} + m_{H_2O} C_{H_2O} T_{I,H_2O} = m_{H_2O} C_{H_2O} T_F + m_{Al} C_{Al} T_F$$

$$m_{Al} C_{Al} T_{I,Al} + m_{H_2O} C_{H_2O} T_{I,H_2O} = T_F (m_{H_2O} C_{H_2O} + m_{Al} C_{Al})$$

$$T_F = \frac{(m_{Al} C_{Al} T_{I,Al} + m_{H_2O} C_{H_2O} T_{I,H_2O})}{(m_{H_2O} C_{H_2O} + m_{Al} C_{Al})}$$

$$\frac{25400 + 47100}{(2092 + 201)} = \frac{((225)(0.9)(125.5)) + ((500)(4.184)(22.5))}{((500)(4.184) + (225)(0.9))}$$

$$\frac{72500}{2290} = \boxed{31.7}$$

$$= \boxed{31.6 \text{ °C}}$$

3) Given the equation below, is the sign of heat, q, positive or negative? Is the reaction exothermic or endothermic? Is the potential energy of the products higher or lower than the potential energy of the reactants?

$$CH_4\,(g) + 2O_2\,(g) \rightarrow CO_2\,(g) + 2H_2O(g) + 802.5KJ$$

exothermic
products lower energy

4) What is the difference between a chemical and a physical property? Give three examples of each.

Chemical
Reactivity w/ other chems
Toxicity
Flamability
Heat of Combustion
Chemical stability

Physical
color
density
volume
mass
boiling point
melting point