Dr. Mike Zach **Chemistry 106 – Spring 2007** **Name:_____**

Surprise Quiz #1 (the one that I told you about)

Chemistry 105 Skills portion:

13. If you were to react the following elements together, what would you expect the formula to be?

Ca with Cl ____$CaCl_2$_____; Na with O _____Na_2O____; Al with S _____ Al_2S_3 _____

14. How much NaCl would you need to make 250. mL of a 1.00M solution? (FW NaCl = 58.44g/mol)

$$\frac{250\text{ mL soln}}{} \times \frac{1\text{L}}{1000\text{mL}} \times \frac{1.00\text{ mol}}{1\text{L}} \times \frac{58.44\text{g NaCl}}{\text{mol}} = 14.61 \rightarrow 14.6\text{ g}$$

15. What is the formula wt of $NiSO_4 \cdot 5H_2O$? 1 @ Ni ➔ 1 x 58.693
1 @ S ➔ 1 x 32.065
9 @ O ➔ 9 x 15.9994
10 @ H ➔ 10 x 1.00794 Total ➔ 244.832

16. A lab technician is given a 500 mL bottle of 12.0 M HCl (aq). The technician needs to make 25.0 mL of a 6.0 M HCl (aq) solution. What volume of 12.0 M HCl (aq) does the technician need to make the diluted solution?

$m_{conc}v_{conc} = m_{dil}v_{dil}$ ➔ $v_{conc} = \frac{m_{dil}v_{dil}}{m_{conc}} = \frac{6.0\text{ M} * 25.0\text{mL}}{12.0\text{ M}} = 12.5\text{ mL}$ ➔ 13 mL w/ SF

(Notice all units cancel to give the units you expect. It is important to carry the units along as a double check of your work.)

17. What are the oxidation numbers of each element in K_2MnO_4 K_ +1 _, Mn_ +6 _, O_ -2 _

18. Balance the following reaction: _2_Al + _ 3 _ CuO ⟶ ___Al_2O_3 + _ 3 _ Cu

19. A calorimeter consists of metal parts with a heat capacity of 950.0 J $^oC^{-1}$ and 850.0 grams of oil with a specific heat of 2.418 J g^{-1} $^oC^{-1}$. Calculate the amount of heat energy required, in kJ, to raise its temperature from 25.00 ^{o}C to 31.60 ^{o}C.

You must recognize that heat is being absorbed into two parts the calorimeter and the oil and should recognize that the units of heat are Joules. The rest is just using unit factor method and significant figures.

Heat of calorimeter + heat of oil = total heat

$$\frac{950.0\text{ J}}{^\circ\text{C}} \times (31.60^\circ\text{C} - 25.00^\circ\text{C}) + \frac{2.418\text{ J}}{\text{g}\ ^\circ\text{C}} \times 850.0\text{ g} \times (31.60^\circ\text{C} - 25.00^\circ\text{C})$$

6270 J (3 SF) + 13564.98 J (3 SF) = 19834.98 J * $\frac{1\text{ kJ}}{}$ ➔ 19.8 KJ

(note that the limit of 3 SF comes from 31.60°C – 25.00°C = 6.60°C)

If significant figures is confusing, please come see me. You will probably save about 30-40 pts before the end of the semester.