CHEM 1105 **ANSWERS TO PROBLEM SET 1**

1. moles $CuSO_4$ in 75.0 mL 0.150 *M* $CuSO_4$ = 75.0 mL x $\frac{0.150 \text{ mole}}{1000 \text{ mL}}$

= 0.01125 mole

moles $CuSO_4$ in 25.0 mL 0.100 *M* $CuSO_4$ = 25.0 mL x $\frac{0.100 \text{ mole}}{1000 \text{ mL}}$

= 0.00250 mole

total moles = 0.01125 + 0.00250 = 0.01375 mole
final volume = (75.0 + 25.0)mL = 100.0 mL = 0.1000 L

final molarity = $\frac{0.01375 \text{ mole}}{0.1000 \text{ L}}$ = 0.138 *M*

2. % Tl-203 = $\frac{1 \text{ x } 100}{(1 + 2.38983)}$ = 29.5000% % Tl-205 = 70.5000%

(202.9723 x 0.295000) + (204.9745 x 0.705000) = 204.384 = AW

3. Let *V* = volume (in mL) of 0.155 *M* NaOH needed
$M_iV_i = M_fV_f$ *V* x 0.155 = (*V* + 250) x 0.100
0.155 *V* - 0.100 *V* = 25.0 0.055 *V* = 25.0 *V* = 455 mL

4. Let *V* = volume (in litres) of 0.155 *M* NaOH needed
total moles NaOH = 0.155 *V* + (0.585 x 0.100) = 0.155 *V* + 0.0585
total volume of final solution = (*V* + 0.100) litres

final molarity = 0.300 = $\frac{0.155\ V + 0.0585}{V + 0.100}$

0.300 *V* + 0.0300 = 0.155 *V* + 0.0585
0.145 *V* = 0.0285 *V* = 0.197 L = 197 mL

5. $\frac{894.5 \text{ coulombs}}{1 \text{ g Ag}}$ x $\frac{107.87 \text{ g Ag}}{1 \text{ mole Ag}}$ x $\frac{1 \text{ electron}}{1.60 \text{ x } 10^{-19} \text{ coulomb}}$ x $\frac{1 \text{ atom Ag}}{1 \text{ electron}}$

= $6.03 \text{ x } 10^{23}$ atoms/mole