Chem 1014
In-Class Problem Set #7
InClass October 6, 1999
Fall 1999

Name_____
TA Name _____
Lab Section #_____

Here are some extra problems to practice on similar to those in ICPS7

1. How many protons and electrons in each of the following?

		Protons	Electrons
a)	Er	**68**	**68**
b)	Cu^{2+}	**29**	**27**
c)	S^{2-}	**16**	**18**

2. How many protons, neutrons and electrons in each of the following?

		Protons	neutrons	electron
a)	$^{48}_{22}Ti$	**22**	**26**	**22**
b)	$^{60}_{28}Ni^{2+}$	**28**	**32**	**26**

3. Complete the following table.

Symbol	# protons	# neutrons	# electrons	charge
$^{81}_{35}Br^{-1}$	**35**	**46**	**36**	**–1**
$^{61}_{20}Ca^{2+}$	20	41	**18**	+2
$^{132}_{55}Cs^{+}$	**55**	77	**54**	+1
$^{127}_{20}Te^{2-}$	**52**	75	54	2-

4. Express each of the following as either a decimal number or in standard scientific notation.

a) 4,320
4.32×10^{3}

b) 1.20×10^{4}
12,000

c) 7.99×10^{-8}
0.0000000799

d) 602,300,000,000,000,000,000,000
6.023×10^{23}

e) 0.000000234
2.34×10^{-7}

e) 13.13
1.313×10^{1}

5. Perform the following operations and report your answer in exponential notation.

a) $(1.78 \times 10^{-6})(4.01 \times 10^{3}) =$ **7×10^{-3}**

b) $(5.62 \times 10^{-5})(2.91 \times 10^{8}) =$ **1.64×10^{4}**

c) $\dfrac{2.39 \times 10^{-3}}{(7.26 \times 10^{-5})} =$ **3.29×10^{1}**

d) $\dfrac{8.45 \times 10^{-2}}{6.12} =$ **1.4×10^{-2}**

e) $(1.31 \times 10^{5}) - (1.04 \times 10^{4}) =$ **1.21×10^{5}**

f) $(3.86 \times 10^{-3}) - (4.29 \times 10^{-2}) =$ **-3.9×10^{-2}**

g) $(4.25 \times 10^{-11}) + (2.56 \times 10^{-7}) =$ **2.56×10^{-7}**

h) $(7.33 \times 10^{5}) + (5.18 \times 10^{4}) =$ **7.85×10^{5}**

6. Balance each of the following equations

a) $2Mg(s) + TiCl_4(l) \rightarrow Ti(s) + 2MgCl_2(s)$

b) $2Br_2(l) + C_2H_2(g) \rightarrow C_2H_2Br_4(l)$

c) $2ZnS(s) + 3O_2(g) \rightarrow 2ZnO(s) + 2SO_2(g)$

d) $Zn(s) + 2NaOH(aq) + 2H_2O(l) \rightarrow Na_2Zn(OH)_4(aq) + H_2(g)$

e) $3H_2(g) + C_6H_6(l) \rightarrow C_6H_{12}(l)$

f) $4C(s) + 6H_2(g) + O_2(g) \rightarrow 2C_2H_5OH(l))$

g) $Hg_2Cl_2(s) \rightarrow 2Hg(l) + Cl_2(g)$

h) $Cl_2(g) + H_2O(l) \rightarrow HCl(aq) + HClO(aq)$

7. Write and balance the equation for each of the following

c) A formation equation for ZnO.

$2Zn(s) + O_2(g) \rightarrow 2ZnO(s)$

d) A formation equation for CO_2.

$C(s) + O_2(g) \rightarrow CO_2(g)$

e) A formation equation for HCl.

$H_2(s) + Cl_2(g) \rightarrow 2HCl(g)$

f) The reaction for the combustion of propane (C_5H_{12}).

$C_5H_{12}(l) + 8O_2(g) \rightarrow 5CO_2(g) + 6H_2O\ (g)$

8. Calculate the number of atoms in each of the following;

a) 1.00 g helium
(note the mass of a helium atom is 6.645×10^{-24} g)

$$1.00\ g\ He \left(\frac{1\ atom\ He}{6.645 \times 10^{-24}\ g} \right)$$

$= 1.5 \times 10^{23}$ atoms H

b) 17.0 g Na atoms
(note the mass of a sodium atom is 3.821×10^{-23} g)

$$17\ g\ Na \left(\frac{1\ atom\ Na}{3.821 \times 10^{-23}\ g} \right)$$

$= 4.45 \times 10^{23}$ atoms O

9. Calculate the number of atoms in each of the following; (Use Avogadro's number to solve these problems.)

a) 2.73 x 10^{-2} g carbon

$$\mathbf{2.73 \times 10^{-2}\ g\ C}\left(\frac{\mathbf{6.023 \times 10^{23}\ atom}}{\mathbf{12\ g\ C}}\right)$$

$$\mathbf{= 1.37 \times 10^{21}\ atoms\ C}$$

b) 5.0397 g silicon

$$\mathbf{5.0397\ g\ Si}\left(\frac{\mathbf{6.023 \times 10^{23}\ atom}}{\mathbf{28.1\ g\ Si}}\right)$$

$$\mathbf{= 1.08 \times 10^{23}\ atoms\ Si}$$

c) 125 g gold

$$\mathbf{125\ g\ C}\left(\frac{\mathbf{6.023 \times 10^{23}\ atom}}{\mathbf{197\ g\ Au}}\right)$$

$$\mathbf{= 3.822 \times 10^{23}\ atoms\ Au}$$

d) 1.5 mol Mg

$$\mathbf{1.5\ mol\ Mg}\left(\frac{\mathbf{6.023 \times 10^{23}\ atom}}{\mathbf{1\ mol}}\right)$$

$$\mathbf{= 9.035 \times 10^{23}\ atoms\ Mg}$$

e) 8.12 x 10^{2} mol iron

$$\mathbf{8.12 \times 10^{2}\ mol\ Fe}\left(\frac{\mathbf{6.023 \times 10^{23}\ atom}}{\mathbf{1\ mol}}\right)$$

$$\mathbf{= 4.892 \times 10^{24}\ atoms\ Au}$$

f) 75 g Al

$$\mathbf{75\ g\ Al}\left(\frac{\mathbf{6.023 \times 10^{23}\ atom}}{\mathbf{27\ g\ Al}}\right)$$

$$\mathbf{= 1.67 \times 10^{24}\ atoms\ Al}$$

10. Calculate the mass in each of the following;

a) 1.04 x 10^{3} mol Kr

$$\mathbf{1.04 \times 10^{3}\ mol\ Kr}\left(\frac{\mathbf{83.8\ g}}{\mathbf{1\ mol}}\right)$$

$$\mathbf{= 8.72 \times 10^{4}\ g\ Kr}$$

b) 5.92 x 10^{22} atoms titanium

$$\mathbf{5.92 \times 10^{22}\ atom\ Al}\left(\frac{\mathbf{47.9\ g\ Ti}}{\mathbf{6.023 \times 10^{23}\ atom}}\right)$$

$$\mathbf{= 4.708\ g\ Ti}$$

c) 1.78 mol CO_2

$$\mathbf{1.78\ mol\ CO_2}\left(\frac{\mathbf{44\ g}}{\mathbf{1\ mol}}\right)$$

$$\mathbf{= 78.3\ g\ CO_2}$$

d) 0.0710 mol C_2H_6

$$\mathbf{0.0710\ mol\ C_2H_6}\left(\frac{\mathbf{30\ g\ C_2H_6}}{\mathbf{1\ mol}}\right)$$

$$\mathbf{= 2.13\ g\ C_2H_6}$$