AP Chemistry
Summer Homework
2018/2019 Academic Year

Names and Formulas

1) Write the formula of the compound in the box provided.

Ions	Na^+	Ca^{2+}	Al^{3+}	NH_4^+	Li^+
Br^-					
O^{2-}					
SO_4^{2-}					
OH^-					
PO_4^{3-}					

2) Fill in the following table with the appropriate ionic formula.

Ion Name	bromide	carbonate	sulfite	oxide	phosphite
Lithium					
Magnesium					
Ammonium					

Write a brief description of each of the following people and their contribution to our understanding of atomic structure.
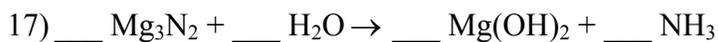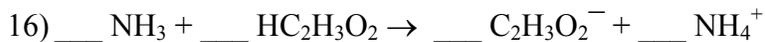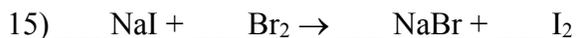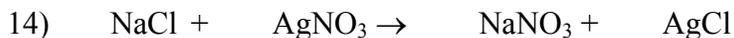
John Dalton

J. J. Thomson

Ernest Rutherford

James Chadwick

Niels Bohr

Johann Balmer

Balance the following equations:

1) ___ $HgO \rightarrow$ ___ $Hg +$ ___ O_2

2) ___ $H_2O +$ ___ $SO_3 \rightarrow$ ___ H_2SO_4

3) ___ HNO_3 ___ $NH_3 \rightarrow$ ___ NH_4NO_3

4) ___ $CO +$ ___ $NO \rightarrow$ ___ $CO_2 +$ ___ N_2

5) ___ $Cu(NO_3)_2 \rightarrow$ ___ $CuO +$ ___ $NO_2 +$ ___ O_2

6) ___ $Eu +$ ___ $HF \rightarrow$ ___ $EuF_3 +$ ___ H_2

7) ___ $C_6H_8ONCl +$ ___ $NaOH \rightarrow$ ___ $C_6H_7ON +$ ___ $H_2O +$ ___ $NaCl$

8) ___ $CaO +$ ___ $NH_4Cl \rightarrow$ ___ $NH_3 +$ ___ $H_2O +$ ___ $CaCl_2$

9) ___ $HNO_3 +$ ___ $Na_2CO_3 \rightarrow$ ___ $NaNO_3 +$ ___ $H_2O +$ ___ CO_2

10) ___ $HCl +$ ___ $MnO_2 \rightarrow$ ___ $MnCl_2 +$ ___ $Cl_2 +$ ___ H_2O

11) ___ $H_2SO_4 \rightarrow$ ___ $SO_3 +$ ___ H_2O

12) ___ $K +$ ___ $Cl_2 \rightarrow$ ___ KCl

13) ___ $KCl +$ ___ $O_2 \rightarrow$ ___ $KClO_3$

14) ___ $NaCl +$ ___ $AgNO_3 \rightarrow$ ___ $NaNO_3 +$ ___ $AgCl$

15) ___ $NaI +$ ___ $Br_2 \rightarrow$ ___ $NaBr +$ ___ I_2

16) ___ $NH_3 +$ ___ $HC_2H_3O_2 \rightarrow$ ___ $C_2H_3O_2^- +$ ___ NH_4^+

17) ___ $Mg_3N_2 +$ ___ $H_2O \rightarrow$ ___ $Mg(OH)_2 +$ ___ NH_3

18) ___ $H_2O +$ ___ $NaCl \rightarrow$ ___ $H_2 +$ ___ $Cl_2 +$ ___ $NaOH$

19) ___ $H_2O +$ ___ $NaOH +$ ___ $Sn \rightarrow$ ___ $H_2 +$ ___ Na_2SnO_3

20) ___ $C_2H_5SH +$ ___ $O_2 \rightarrow$ ___ $CO_2 +$ ___ $H_2O +$ ___ SO_2

Let's do some math!
1. Round off the following measurements to <u>three</u> significant figures:

A) 15.474 sec   _____   B) 0.088372 m   _____

C) 34.0453 kcal   _____   D) 8.302 x 10^4 m   _____

E) 3.5064123 cm   _____

2. How many significant figures are in each of the following measurements:

A) ____ 55.555 kcal   C) ____ 0.0070 cm   E) ____ 300.0

B) ____ 4001 g   D) ____ 100 m

3. Convert the following numbers to scientific notation:

A) 2, 115, 000, 000, 000   _____

B) 1, 041, 000, 000   _____

C) 0.000 000 825   _____

D) 11, 615   _____

E) 0.000 004 300   _____

4. Perform the following on a calculator, remember significant figures.

A) $(9.87 \times 10^{-6})(5.43 \times 10^{-2})$ = _____

B) $2.222 \times 10^4 + 3.33 \times 10^4$ = _____

C) $6.623 \times 10^3 - 5.01 \times 10^3$ = _____

D) $3.140 \times 10^9 / 1.57 \times 10^5$ = _____

E) $1.221 \times 10^3 / 4.07 \times 10^5$ = _____

5. Multiply and divide the powers of ten without a calculator.

A) $10^4 \times 10^2$ _____   B) $10^{-3} \times 10^6$ _____

C) $10^9 / 10^6$ _____   D) $10^2 / 10^7$ _____

E) $10^{-4} \times 10^9$ _____

Solve the following math problems. You must show your work and use significant figures and units in your answers. Show the original algebraic formula that you use to solve the problem. Some basic geometric formulas will be used.

1) What is the area of a rectangle whose sides are 7.50 cm and 15.50 cm?

1) _____

2) A cube has a side of 2.5 cm. What is the volume of the cube?

2) _____

3) A circle has a radius of 4.25 m. What is the circumference of the circle?

3) _____

4) A circle has a radius of 4.25 m. What is the area of the circle?

4) _____

5) What is the sum of 5.0 g and 9.28 g?

5) _____

6) What is the difference between 15.000 mL and 7.38 mL?

6) _____

Fill in the following table using a periodic table.

Symbol	Atomic #	Mass #	Protons	Neutrons	Electrons
C					
	12				
			24		
Br					

Fill in the following table dealing with ions.

Symbol	Atomic #	Mass	Protons	Neutrons	Electrons
K^+					
Cl^-					
Ca^{2+}					
O^{2-}					
B^{3+}					

The mass spectrograph of copper shows two isotopes. One with mass 62.9296 g/mole that has a percentage of 69.200 % and one that is 30.800 % with mass 64.9278g/mole. Find the molar mass of a sample of naturally occurring copper.

Calculate the molar mass of the following compounds to two places after the decimal.

1. NH_3 _____   2. Na_2SO_4 _____

3. $Mg(ClO_2)_2$ _____   4. F_2 _____

5. $Ca_3(PO_4)_2$ _____   6. FeO _____

7. $Be_3Al_2Si_6O_{18}$ _____   8. $Cu_2(OH)_2CO_3$ _____

9. $CaCO_3MgCO_3$ _____   10. S_8 _____

11. $CuSO_45H_2O$ _____   12. BeO _____

Solve the following problems dealing with moles.

1. How many moles of Cr_2S_3 are there in 200.21 g of Cr_2S_3?

1. _____

2. How many grams of $CaCO_3$ are there in 0.250 moles?

2. _____

3. How many molecules are in 0.1661 moles of NaCl?

3. _____

4. How many moles are in 2.500×10^{23} molecules of NO gas?
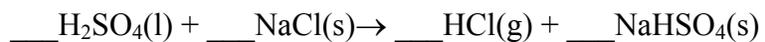
4. _____

5. How many molecules are in 100.0 g of I_2?

5. _____

Solve the following stoichiometry problem.
The production of hydrochloric acid can be attained by the following reaction:

$$\_\_\_H_2SO_4(l) + \_\_\_NaCl(s) \rightarrow \_\_\_HCl(g) + \_\_\_NaHSO_4(s)$$

a. How many grams of HCl can be produced by the reaction of 100.0 g NaCl?

a. _____

b. How many grams of HCl can be produced by 100.0 g of H_2SO_4?

b._____

c. Which is the limiting reactant?

c. _____

d. Which is the excess reactant?

d. _____

e. How much H_2SO_4 is left after the reaction?

e._____

f. How much NaCl is left after the reaction?

f._____

g. If 35.10 grams of HCl is actually produced what is the percent yield?

g. _____

Solution Problems

1. What is the molarity of 2.500 moles of KCl in 1.250 liters of water?

2. Assume 6.73 g of Na_2CO_3 is dissolved in enough water to make 25.00 mL. What is the concentration?

3. What volume of 0.123M NaOH contains 0.025 moles of NaOH?

4. If I have 2.75 L of 0.500 M $NaHCO_3$, how many moles do I have? How many grams?

5. How many grams of KOH are needed to make 127.3 mL of 0.567 M solution?

6. Hydrochloric acid comes as a concentrate. It is 12.1 Molar. How many mL of concentrate are required to make 1.000 L of 1.000M?

7. If 25.00 mL of concentrated (12.1M) HCl are diluted to 2.50 L what is the new concentration?