

Unit 12 – Weekly Agenda – Week 2 Quarter 4

Honors Physical Science

Your Name: Key

After this week I will be able to successfully...

1. Apply molar masses to calculate grams or moles of a substance.
2. Apply use of periodic table to quantitatively analyze mass percent composition and empirical formulas.
3. Analyze lab data to calculate empirical and molecular formulas.
4. Convert between mass and moles by synthesizing atomic masses from periodic table.
5. Consider and define the law of conservation of mass by balancing equations.
6. Apply prior knowledge of nomenclature and bonding to write chemical equations.

Date	Activities	What's Due
Monday 4/16	-Review quiz -Review Balancing equations - Chalk portraits – Moles of my Face	
	Homework: LearnSmart & Rest of packet – plan accordingly. Entire packet should be complete by Friday!	
Tuesday 4/17	-EOC: ELA II 8am-12pm -EOC: Algebra 12:30-4pm	LearnSmart
	Homework: p. 1-5	
Wednesday 4/18	-EOC: ELA I 8am-12pm -EOC: Biology 12:30-4pm	p. 1-5
	Homework: p. 6-9	
Thursday 4/19	-EOC: Geometry 8am-12pm -EOC: Gov and US History 12:30-4pm	p. 6-9
	Homework: p. 10-15	
Friday 4/20	-Quiz on Balancing Equations -Balancing equations extra practice	- LearnSmart & Packet
	Homework: Flex	

Remember... Test is coming up 4/27 (next Friday). All Unit 12 assignments are due for full credit by April 27th. Don't put it off!!!!

NAME: _____

BLOCK: _____

DATE: _____

CHEMISTRY: COUNTING ATOMS IN COMPOUNDS WORKSHEET #7.0.1

INSTRUCTIONS: Write the quantity of atoms of each element opposite the formula of the compound for the quantity of formula units and molecules shown:

For example: $5P_2O_3$ $P = (5 \times 2 =) 10$ $O = (5 \times 3 =) 15$

For example: $4Zn(NO_3)_2$ $Zn = (4 \times 1 =) 4$ $N = (4 \times 1 \times 2 =) 8$ $O = (4 \times 3 \times 2 =) 24$

1. $4K_2CO_3$ $K = 8$ $C = 4$ $O = 12$
2. $2Sr_3(PO_4)_2$ $Sr = 6$ $P = 4$ $O = 16$
3. $3N_4O_{10}$ $N = 12$ $O = 30$
4. $2(NH_4)_3N$ $N = 8$ $H = 24$
5. $8Cl_2O$ $Cl = 16$ $O = 8$
6. $Ca(C_2H_3O_2)_2$ $Ca = 2$ $C = 4$ $H = 6$ $O = 4$
7. $12NaBr$ $Na = 12$ $Br = 12$
8. $4Al(OH)_3$ $Al = 4$ $O = 12$ $H = 12$
9. $3NaHCO_3$ $Na = 3$ $H = 3$ $C = 3$ $O = 9$
10. $5Ga_2(Cr_2O_7)_3$ $Ga = 10$ $Cr = 30$ $O = 105$
11. $7C_2S_2$ $C = 14$ $S = 14$
12. $4Fe_2O_3$ $Fe = 8$ $O = 12$
13. $6Ba(MnO_4)_2$ $Ba = 6$ $Mn = 12$ $O = 48$
14. $3V_2O_5$ $V = 6$ $O = 15$
15. $2KNO_3$ $K = 2$ $N = 2$ $O = 6$
16. $9MgSO_4$ $Mg = 9$ $S = 9$ $O = 36$
17. $5Al_2(SiO_3)_2$ $Al = 10$ $Si = 10$ $O = 30$
18. $4Au(IO_3)_3$ $Au = 4$ $I = 12$ $O = 36$

(Continued)

INSTRUCTIONS: Write the quantity of atoms of each element opposite the formula of the compound for the quantity of formula units and molecules shown:

For example: $5P_2O_3$ P = $(5 \times 2 =) 10$ O = $(5 \times 3 =) 15$

For example: $4Zn(NO_3)_2$ Zn = $(4 \times 1 =) 4$ N = $(4 \times 1 \times 2 =) 8$ O = $(4 \times 3 \times 2 =) 24$

19. $8SnCl_4$ Sn = 8 Cl = 32
20. $6Cu_2SeO_4$ Cu = 12 Se = 6 O = 24
21. $3AsBr_3$ As = 3 Br = 9
22. $2H_2SO_4$ H = 4 S = 2 O = 8
23. SBr_2 S = 1 Br = 2
24. $4Ca(OH)_2$ Ca = 4 O = 8 H = 8
25. $5Mg_3(PO_4)_2$ Mg = 15 P = 10 O = 40
26. $12H_2O$ H = 24 O = 12
27. $5N_2O_4$ N = 10 O = 20
28. $3ClF$ Cl = 3 F = 3
29. $7P_2O_5$ P = 14 O = 35
30. $2KrCl_6$ Kr = 2 Cl = 12
31. $5Al(C_2H_3O_2)_2$ Al = 5 C = 20 H = 30 O = 20
32. $3(NH_4)_2Cr_2O_7$ N = 6 H = 24 Cr = 6 O = 21
33. $5Fe_3(PO_4)_2$ Fe = 15 P = 10 O = 40
34. $2NH_4NO_3$ N = 4 H = 8 O = 10
35. $5BaC_4H_4O_6$ Ba = 5 C = 20 H = 20 O = 30
36. $4Cu(HSO_3)_2$ Cu = 4 H = 8 S = 8 O = 24
37. $9Au(NO_2)_2$ Au = 9 N = 18 O = 36
38. $3K_2ZnO_2$ K = 6 Zn = 3 O = 6
39. $3Sr(MnO_4)_2$ Sr = 3 Mn = 6 O = 24
40. $4Al_2(CO_3)_3$ Al = 8 C = 12 O = 36

Chapter 7 Worksheet #1

Balancing Chemical Equations

Balance the equations below:

- 1) $\underline{\quad}$ N₂ + 3 H₂ → 2 NH₃
- 2) 2 KClO₃ → 2 KCl + 3 O₂
- 3) 2 NaCl + $\underline{\quad}$ F₂ → 2 NaF + $\underline{\quad}$ Cl₂
- 4) 2 H₂ + $\underline{\quad}$ O₂ → 2 H₂O
- 5) $\underline{\quad}$ Pb(OH)₂ + 2 HCl → 2 H₂O + $\underline{\quad}$ PbCl₂
- 6) 2 AlBr₃ + 3 K₂SO₄ → 6 KBr + $\underline{\quad}$ Al₂(SO₄)₃
- 7) $\underline{\quad}$ CH₄ + 2 O₂ → $\underline{\quad}$ CO₂ + 2 H₂O
- 8) $\underline{\quad}$ C₃H₈ + 5 O₂ → 3 CO₂ + 4 H₂O
- 9) 2 C₈H₁₈ + 25 O₂ → 16 CO₂ + 18 H₂O
- 10) $\underline{\quad}$ FeCl₃ + 3 NaOH → $\underline{\quad}$ Fe(OH)₃ + 3 NaCl
- 11) 4 P + 5 O₂ → 2 P₂O₅
- 12) 2 Na + 2 H₂O → 2 NaOH + $\underline{\quad}$ H₂
- 13) 2 Ag₂O → 4 Ag + $\underline{\quad}$ O₂
- 14) $\underline{\quad}$ S₈ + 12 O₂ → 8 SO₃
- 15) 10 CO₂ + 10 H₂O → $\underline{\quad}$ C₆H₁₂O₆ + 9 O₂
- 16) 2 K + $\underline{\quad}$ MgBr₂ → 2 KBr + $\underline{\quad}$ Mg
- 17) 2 HCl + $\underline{\quad}$ CaCO₃ → $\underline{\quad}$ CaCl₂ + $\underline{\quad}$ H₂O + $\underline{\quad}$ CO₂
- 18) $\underline{\quad}$ HNO₃ + $\underline{\quad}$ NaHCO₃ → $\underline{\quad}$ NaNO₃ + $\underline{\quad}$ H₂O + $\underline{\quad}$ CO₂ ✓ balanced
- 19) 2 H₂O + $\underline{\quad}$ O₂ → 2 H₂O₂
- 20) 2 NaBr + $\underline{\quad}$ CaF₂ → 2 NaF + $\underline{\quad}$ CaBr₂
- 21) $\underline{\quad}$ H₂SO₄ + 2 NaNO₂ → 2 HNO₂ + $\underline{\quad}$ Na₂SO₄

Word Equations

Write the word equations below as chemical equations and balance:

- 1) Zinc and lead (II) nitrate react to form zinc nitrate and lead.



already
✓ balanced

- 2) Aluminum bromide and chlorine gas react to form aluminum chloride and bromine gas.

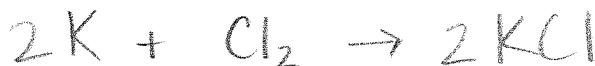


diatomic

- 3) Sodium phosphate and calcium chloride react to form calcium phosphate and sodium chloride.



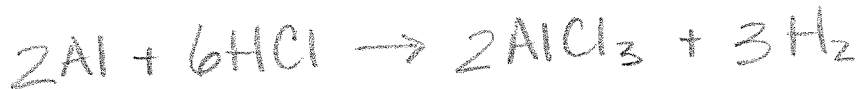
- 4) Potassium metal and chlorine gas combine to form potassium chloride.



monatomic

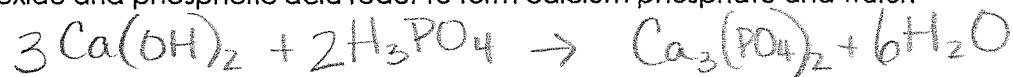
diatomic

- 5) Aluminum and hydrochloric acid react to form aluminum chloride and hydrogen gas.



diatomic

- 6) Calcium hydroxide and phosphoric acid react to form calcium phosphate and water.



- 7) Copper and sulfuric acid react to form copper (II) sulfate and water and sulfur dioxide.



- 8) Hydrogen gas and nitrogen monoxide react to form water and nitrogen gas.



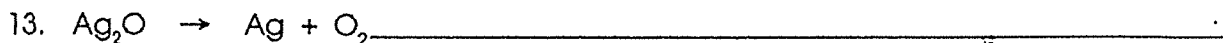
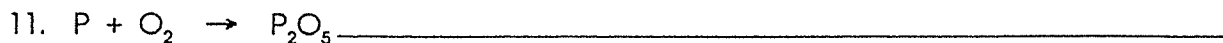
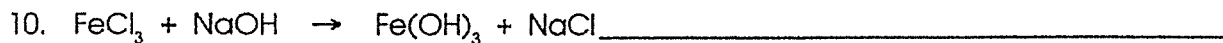
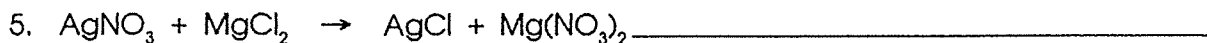
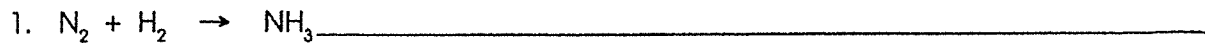
diatomic

repeats!

BALANCING CHEMICAL EQUATIONS

Name _____

Rewrite and balance the equations below.



W
Wr
1
2
3
4
5
6
7
8

5

PERCENTAGE COMPOSITION

Name _____

Determine the percentage composition of each of the compounds below.

1. KMnO_4

$$\text{K} = \underline{24.7\%}$$

$$\text{Mn} = \underline{34.7\%}$$

$$\text{O} = \underline{40.5\%}$$

2. HCl

$$\text{H} = \underline{2.76\%}$$

$$\text{Cl} = \underline{97.24\%}$$

3. $\text{Mg}(\text{NO}_3)_2$

$$\text{Mg} = \underline{16.39\%}$$

$$\text{N} = \underline{18.89\%}$$

$$\text{O} = \underline{64.72\%}$$

4. $(\text{NH}_4)_3\text{PO}_4$

$$\text{N} = \underline{28.19\%}$$

$$\text{H} = \underline{8.11\%}$$

$$\text{P} = \underline{20.77\%}$$

$$\text{O} = \underline{42.93\%}$$

5. $\text{Al}_2(\text{SO}_4)_3$

$$\text{Al} = \underline{15.77\%}$$

$$\text{S} = \underline{28.12\%}$$

$$\text{O} = \underline{56.11\%}$$

Solve the following problems.

6. How many grams of oxygen can be produced from the decomposition of 100. g of KClO_3 ? 39.2g

7. How much iron can be recovered from 25.0 g of Fe_2O_3 ? 17.5g

8. How much silver can be produced from 125 g of Ag_2S ? 109g

DETERMINING EMPIRICAL FORMULAS

Name _____

What is the empirical formula (lowest whole number ratio) of the compounds below?

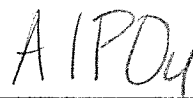
1. 75% carbon, 25% hydrogen



2. 52.7% potassium, 47.3% chlorine



3. 22.1% aluminum, 25.4% phosphorus, 52.5% oxygen



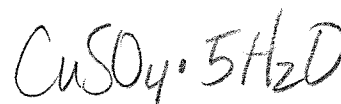
4. 13% magnesium, 87% bromine



5. 32.4% sodium, 22.5% sulfur, 45.1% oxygen



6. 25.3% copper, 12.9% sulfur, 25.7% oxygen, 36.1% water



X

DETERMINING MOLECULAR FORMULAS (TRUE FORMULAS)

Name _____

Solve the problems below.

1. The empirical formula of a compound is NO_2 . Its molecular mass is 92 g/mol. What is its molecular formula?



2. The empirical formula of a compound is CH_2 . Its molecular mass is 70 g/mol. What is its molecular formula?



3. A compound is found to be 40.0% carbon, 6.7% hydrogen and 53.5% oxygen. Its molecular mass is 60. g/mol. What is its molecular formula?



4. A compound is 64.9% carbon, 13.5% hydrogen and 21.6% oxygen. Its molecular mass is 74 g/mol. What is its molecular formula?



5. A compound is 54.5% carbon, 9.1% hydrogen and 36.4% oxygen. Its molecular mass is 88 g/mol. What is its molecular formula?



8

WORD EQUATIONS

Name _____

Write the word equations below as chemical equations and balance.

1. zinc + lead (II) nitrate yield zinc nitrate + lead



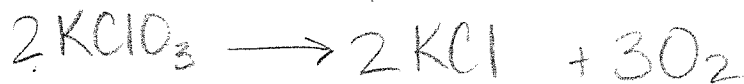
2. aluminum bromide + ^{diatomic}chlorine yield aluminum chloride + ^{diatomic}bromine



3. sodium phosphate + calcium chloride yield calcium phosphate + sodium chloride



potassium chlorate when heated yields potassium chloride + ^{diatomic}oxygen gas



aluminum + hydrochloric acid yield aluminum chloride + ^{diatomic}hydrogen gas



calcium hydroxide + phosphoric acid yield calcium phosphate + water



copper + sulfuric acid yield copper (II) sulfate + water + sulfur dioxide



^{diatomic}hydrogen + nitrogen monoxide yield water + ^{diatomic}nitrogen



9

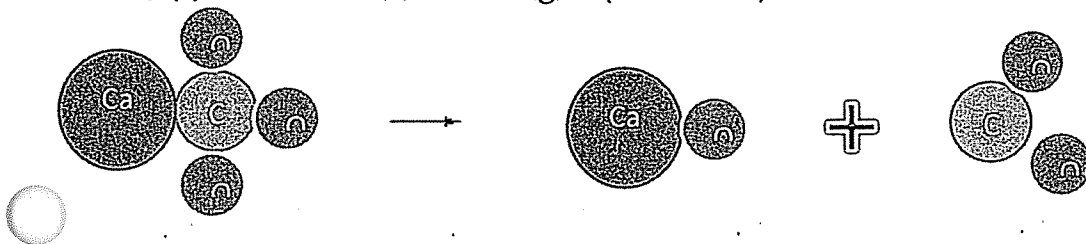
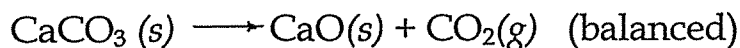
Honors Physical Science -Drawing/Balancing Chemical Reactions

Name: _____ Date: _____

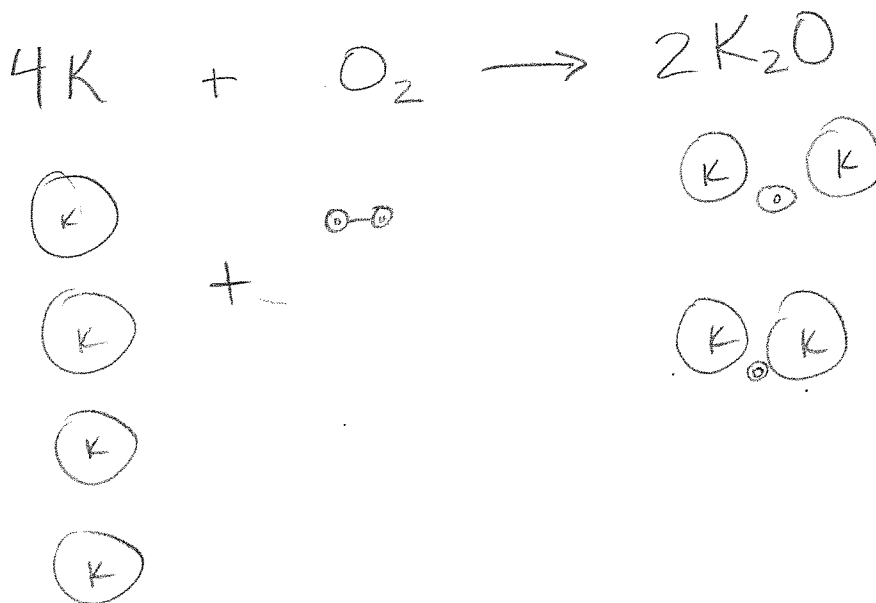
Below, you are given word equations of varying reactions. For each:

1. Rewrite and **balance** the word reactions as chemical equations.
2. Then, using differences in qualities such as *color and size*, show the particles of the reactants and products using **molecular drawings** (see the video and example for guidance).

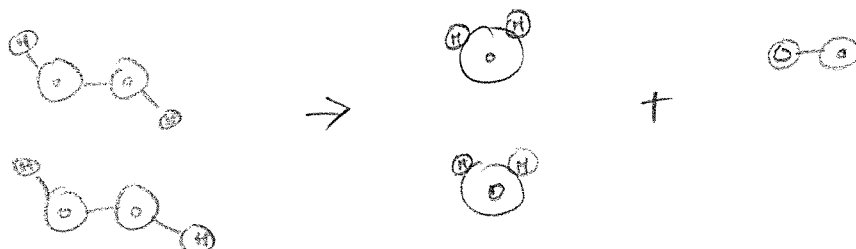
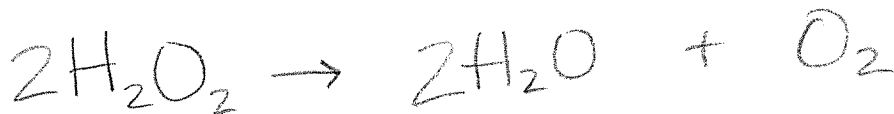
Example: Calcium carbonate in solid form, when heated, decomposes into solid calcium oxide and carbon dioxide gas.



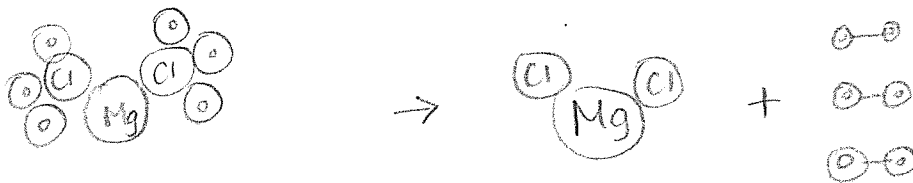
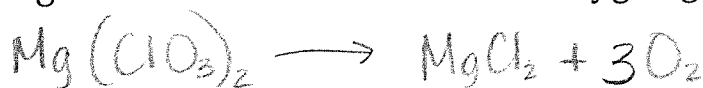
1. Pure potassium metal combines with ^{diatomic} oxygen gas to form potassium oxide powder.



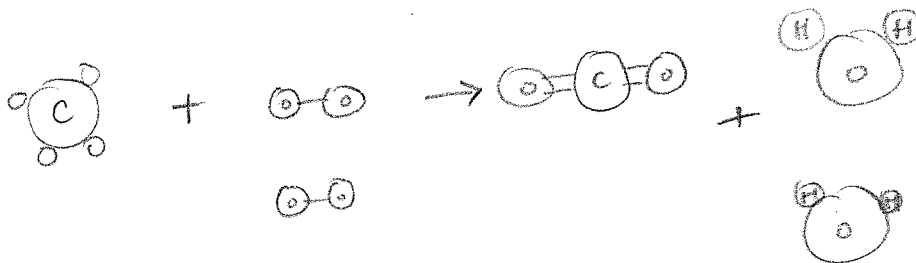
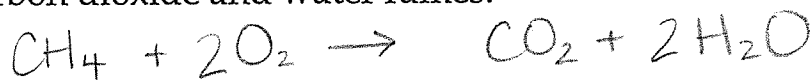
2. Hydrogen peroxide can spontaneously decompose into water and diatomic oxygen gas, making it less potent.



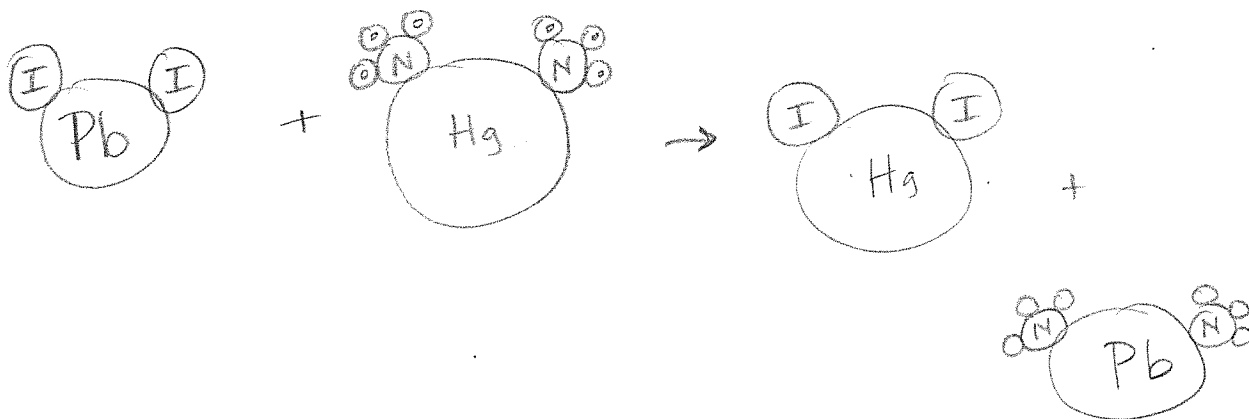
3. Magnesium chlorate is a sticky white crystal substance that decomposes into aqueous magnesium chloride and diatomic oxygen gas.



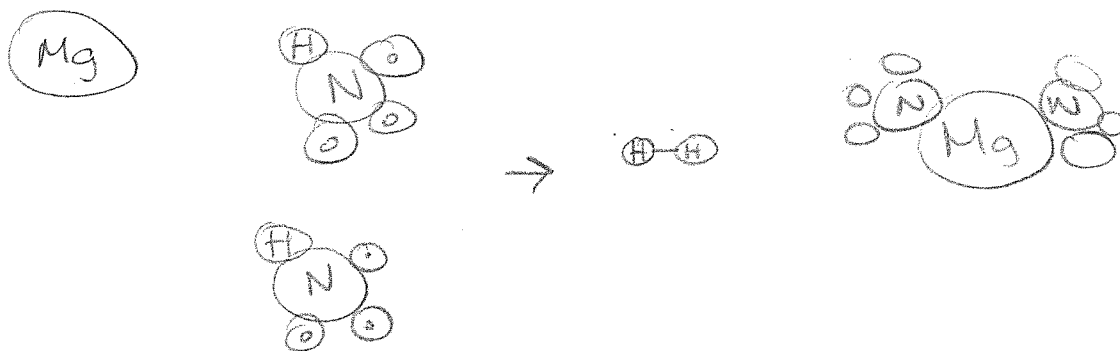
4. Methane (CH_4) reacts with diatomic oxygen in the barrel of a Bunsen burner to produce carbon dioxide and water fumes.



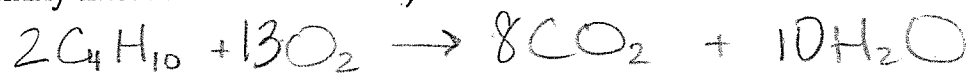
5. Aqueous lead (II) iodide is added to aqueous mercury (II) nitrate, which results in a mercury (II) iodide precipitate and aqueous lead (II) nitrate.



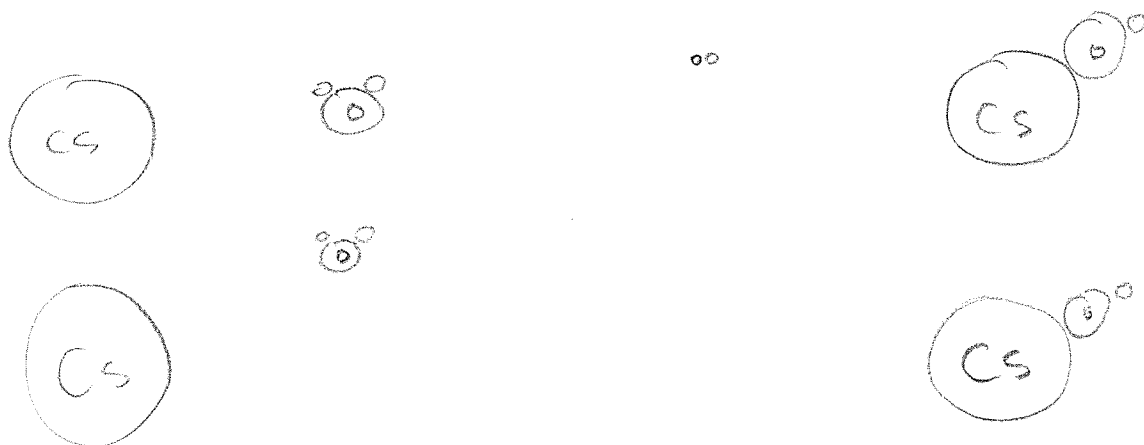
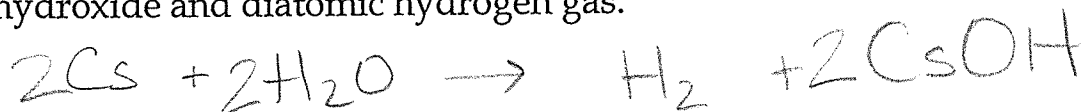
6. Pure magnesium metal is dropped into a beaker of nitric acid, resulting in a violent reaction producing heavy clouds of diatomic hydrogen gas and aqueous magnesium nitrate.



7. Show the combustion of butane gas, or also known as tetracarbon decahydride, with diatomic oxygen. It produces carbon dioxide and water. (Write small – there are many molecules involved.)



8. Pure cesium metal reacts violently when dropped into pure water, forming cesium hydroxide and diatomic hydrogen gas.

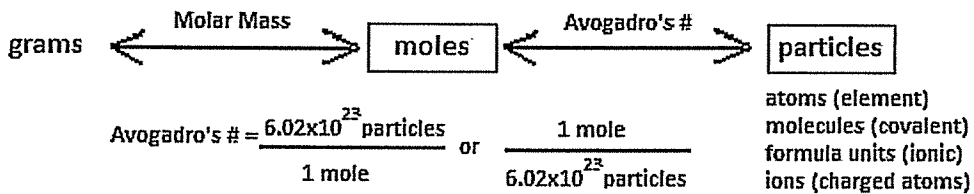


Mole Conversions Worksheet
Honors Physical Science

Name: _____
Date: _____

Directions: Show ALL of your work. Make sure to include units!!!!

Mole-Particle Conversions (use Avogadro's number for your conversions)



1. How many moles of magnesium are in 3.01×10^{22} atoms of magnesium?

$$\frac{3.01 \times 10^{22}}{6.02 \times 10^{23}}$$

2. How many glucose molecules are there in 4.00 moles of glucose, $C_6H_{12}O_6$?

$$4 \times (6.02 \times 10^{23})$$

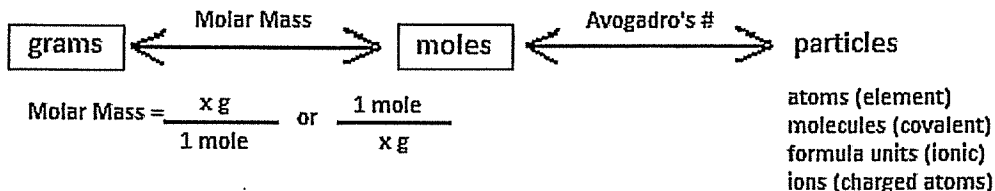
3. How many moles are 1.20×10^{25} formula units of calcium iodide?

$$\frac{1.20 \times 10^{25}}{6.02 \times 10^{23}}$$

4. How many formula units are in 12.5 moles of calcium phosphate?

$$12.5 \times (6.02 \times 10^{23})$$

Mole-Mass Conversions (use the molar mass from the periodic table for your conversions)



1. How many moles are in 28 grams of CO_2 ?

$$\frac{28 \text{ g}}{44 \text{ g}} \times 1 \text{ mol}$$

2. What is the mass of 5 moles of Fe_2O_3 ?

$$5 \text{ mol} \times \frac{159.6 \text{ g}}{1 \text{ mol}}$$

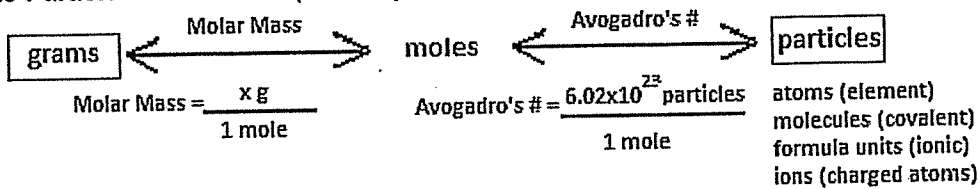
3. Find the number of moles of argon in 452 g of argon.

$$\frac{452 \text{ g}}{39.9 \text{ g}} \times 1 \text{ mol}$$

4. How many grams are in 3.45 moles of CO_2 ?

$$3.45 \text{ mol} \times 44 \text{ g}$$

Gram to Particle Conversions (two step conversions using molar mass and Avogadro's number)



1. How many oxygen molecules are in 3.36 g of oxygen (O₂) [2 x mass of O]?

$$\frac{3.36 \text{ g}}{32 \text{ g}} \times \frac{1 \text{ mol}}{1 \text{ mol}} \times \frac{6.02 \times 10^{23}}{1 \text{ mol}}$$

2. Find the mass in grams of 2.00 x 10²³ molecules of F₂.

$$\frac{2.00 \times 10^{23}}{6.02 \times 10^{23}} \times \frac{1 \text{ mol}}{1 \text{ mol}} \times 38 \text{ g}$$

3. Determine the number of molecules of 14 g of nitrogen dioxide (NO₂).

$$\frac{14 \text{ g}}{46 \text{ g}} \times \frac{1 \text{ mol}}{1 \text{ mol}} \times \frac{6.02 \times 10^{23}}{1 \text{ mol}}$$

4. Find the mass, in grams, of 1.00 x 10²³ molecules of N₂.

$$\frac{1.00 \times 10^{23}}{6.02 \times 10^{23}} \times \frac{1 \text{ mol}}{1 \text{ mol}} \times 28 \text{ g}$$

5. Aspartame is an artificial sweetener that is 160 times sweeter than sucrose (table sugar) when dissolved in water. It is marketed by G.D. Searle as *Nutra Sweet*. The molecular formula of aspartame is C₁₄H₁₈N₂O₅.

a) Calculate the molar mass of aspartame.

$$168 + 18 + 24 + 80 = 290 \text{ g/mol}$$

b) How many moles are in 10.5 g of aspartame?

$$\frac{10.5 \text{ g}}{290 \text{ g}} = 0.036 \text{ mol}$$

c) How many molecules are in 10.5 g of aspartame?

$$0.036 \text{ mol} \times \frac{6.02 \times 10^{23}}{1 \text{ mol}} = 2.232 \times 10^{22}$$

e) How many atoms of nitrogen are in 1.2 grams of aspartame?

$$\frac{1.2 \text{ g}}{290 \text{ g}} \times \frac{1 \text{ mol}}{1 \text{ mol}} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ molecule}} \times \frac{2 \text{ N atoms}}{1 \text{ molecule}}$$

$$4.98 \times 10^{21} \text{ N atoms}$$