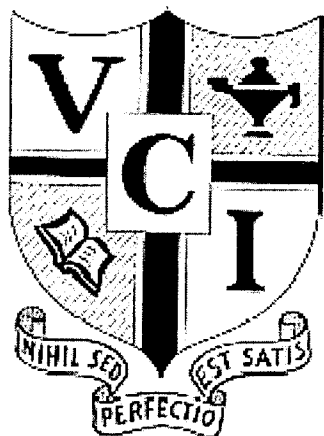


Science Notebook



30S

Chemistry

The Mole

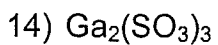
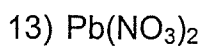
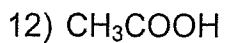
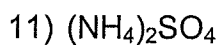
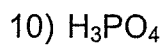
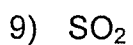
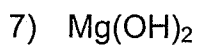
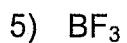
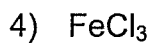
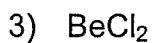
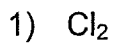
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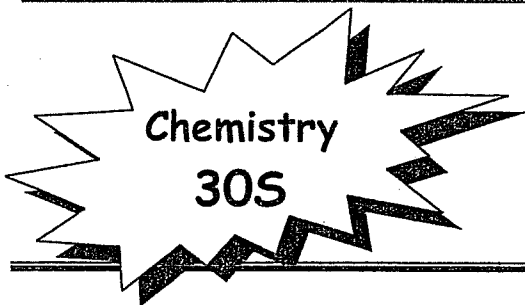
**Chemistry
30S**

Chemical Reactions Molar Mass Worksheet

Calculate the molar masses of the following chemicals. Show all work.



Student Name: _____ Date: _____



The Mole

Mole Calculation Worksheet

Answer the following questions in the space provided.

- 1) How many moles are in 15 grams of lithium?

- 2) How many grams are in 2.4 moles of sulfur?

- 3) How many moles are in 22 grams of argon?

- 4) How many grams are in 88.1 moles of magnesium?

- 5) How many moles are in 2.3 grams of phosphorus?

- 6) How many grams are in 11.9 moles of chromium?

- 7) How many moles are in 9.8 grams of calcium?

- 8) How many grams are in 238 moles of arsenic?

What are the molecular weights of the following compounds?

9) NaOH

12) H₃PO₄

10) H₂O

13) Mn₂Se₇

11) MgCl₂

14) (NH₄)₂SO₄

15) How many grams are in 4.5 moles of sodium fluoride, NaF?

16) How many moles are in 98.3 grams of aluminum hydroxide, Al(OH)₃?

17) How many grams are in 0.02 moles of beryllium iodide, BeI₂?

18) How many moles are in 68 grams of copper (II) hydroxide, Cu(OH)₂?

19) How many grams are in 3.3 moles of potassium sulfide, K₂S?

20) How many moles are in 1.2×10^3 grams of ammonia, NH₃?

21) How many grams are in 2.3×10^{-4} moles of calcium phosphate, Ca₃(PO₃)₂?

22) How many moles are in 3.4×10^{-7} grams of silicon dioxide, SiO₂?

23) How many grams are in 1.11 moles of manganese sulfate, Mn₃(SO₄)₇?

Student Name: _____ Date: _____

Chemistry
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The Mole

Moles/Mass Conversions

Answer the following questions in the space provided. Given the following, find the number of moles:

- 1) 30 grams of H_3PO_4

- 2) 25 grams of HF

- 3) 110 grams of NaHCO_3

- 4) 1.1 grams of FeCl_3

- 5) 987 grams of $\text{Ra}(\text{OH})_2$

- 6) 564 grams of copper

7) 12.3 grams of CO_2

8) 89 grams of $\text{Pb}(\text{CH}_3\text{COO})_4$

Given the following, find the number of grams:

9) 4 moles of $\text{Cu}(\text{CN})_2$

10) 5.6 moles of C_6H_6

11) 21.3 moles of BaCO_3

12) 1.2 moles of $(\text{NH}_4)_3\text{PO}_3$

13) 9.3×10^{-3} moles of SmO

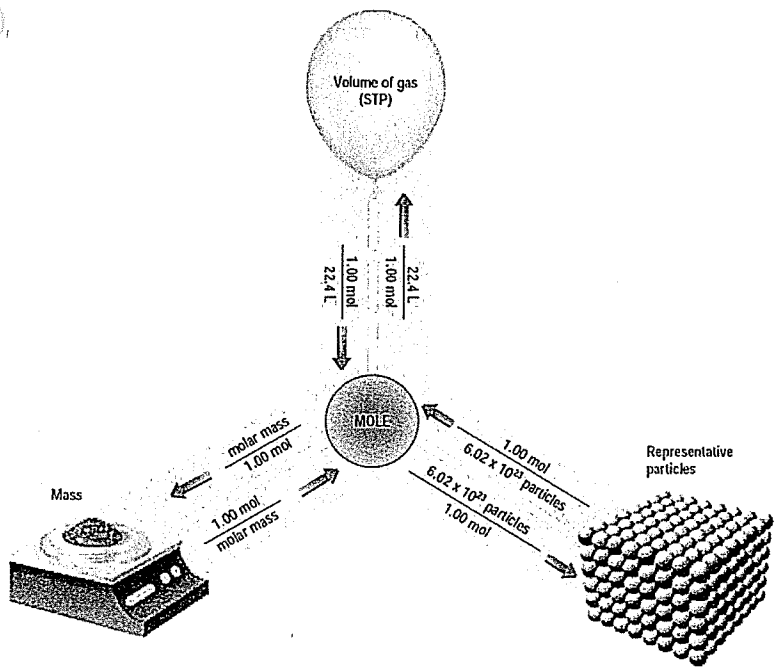
14) 6.6 moles of ZnO

15) 5.4 moles of K_2SO_4

16) 88.4 moles of Nl_3

Name: _____

Date: _____



Conversion Factors:

(these factors describe what one mole of a substance can be equal to, these form the “bridges” of our dimensional analysis).

1 mole = 6.02×10^{23} atoms

1 mole = element’s atomic mass in grams (calculated the same way formula mass is calculated)

1 mole = 22.4 liters of ANY gas at STP*

*STP = standard temperature and pressure

Particle Conversion: Changing between units of Moles and Atoms

1. How many Mg atoms are in 3.24 moles of Mg?

Starting amount (moles)

Conversion Factor

Ending amount (atoms)

2. 2.68×10^{24} atoms of Cu equal how many moles?

Starting amount (atoms)

Conversion Factor

Ending amount (moles)

3. How many moles are 1.505×10^{23} Na atoms?

Starting amount (atoms)

Conversion Factor

Ending amount (moles)

Mass Conversions: Converting between Grams and Moles

4. Convert 5.00 moles of carbon to grams.

Starting amount (moles)

Conversion Factor

Ending amount (grams)

5. Convert 4.86×10^4 g of Mg to moles.

Starting amount (grams)

Conversion Factor

Ending amount (moles)

6. Convert 9.213 moles of Fe to grams.

Starting amount

Conversion Factor

Ending amount

Volume Conversions: Converting between Volume at STP and Moles

7. What volume will 5 moles of O_2 gas occupy at STP?

Starting amount (moles)

Conversion Factor

Ending amount (Volume in L)

8. A container holds 7.5 liters of CO_2 at STP, how many moles of gas is this?

9. H_2 gas at STP occupies 57L of space, how many moles of H_2 are present?

Mixed Mole Problems (some may require more than one step)

10. Convert 84,520 mg of Ne to atoms.

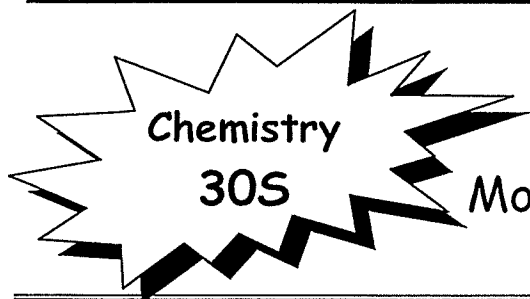
11. How many atoms are in 45.6 grams of sulfur?

12. How many moles are in 68 grams of copper (II) hydroxide, $\text{Cu}(\text{OH})_2$?

13. What is the mass of 8.944×10^{18} iron atoms in grams?

14. How many grams are in 3.3 moles of potassium sulfide, K_2S ?

Student Name: _____ Date: _____



The Mole

Moles, Representative Particles and Mass Worksheet

Answer the following questions in the space provided.

- 1) How many representative particles are there in 24 grams of FeF_3 ?
- 2) How many representative particles are there in 450 grams of Na_2SO_4 ?
- 3) How many grams are there in 2.3×10^{24} atoms of silver?
- 4) How many grams are there in 7.4×10^{23} representative particles of AgNO_3 ?
- 5) How many grams are there in 7.5×10^{23} molecules of H_2SO_4 ?
- 6) How many representative particles are there in 122 grams of $\text{Cu}(\text{NO}_3)_2$?
- 7) How many grams are there in 9.4×10^{25} molecules of H_2 ?

- 8) How many representative particles are there in 230 grams of CoCl_2 ?
- 9) How many representative particles are there in 2.3 grams of NH_4SO_2 ?
- 10) How many grams are there in 3.3×10^{23} molecules of N_2I_6 ?
- 11) How many molecules are there in 200 grams of CCl_4 ?
- 12) How many grams are there in 1×10^{24} molecules of BCl_3 ?
- 13) How many grams are there in 4.5×10^{22} particles of $\text{Ba}(\text{NO}_2)_2$?
- 14) How many representative particles are there in 9.34 grams of LiCl ?
- 15) How many grams do 4.3×10^{21} representative particles of UF_6 weigh?
- 16) How many molecules are there in 230 grams of NH_4OH ?

Percentage Composition Worksheet

Give the % composition of all elements in these compounds. **Show all work!**

- 1) ammonium sulfite % N _____
 % H _____
 % S _____
 % O _____
-

- 2) aluminum acetate % Al _____
 % C _____
 % H _____
 % O _____
-

- 3) sodium bromide % Na _____
 % Br _____
-

- 4) copper (II) hydroxide % Cu _____
 % O _____
 % H _____
-

- 5) magnesium carbonate % Mg _____
 % C _____
 % O _____
-

Student Name: _____ Date: _____

305 Chemistry

Chemical Reactions

Percent Composition and Molecular Formulas

Answer these problems in the space provided. Show all work.

- 1) What's the empirical formula of a molecule containing 65.5% carbon, 5.5% hydrogen, and 29.0% oxygen?
- 2) If the molar mass of the compound in problem 1 is 110 grams/mole, what's the molecular formula?
- 3) What's the empirical formula of a molecule containing 18.7% lithium, 16.3% carbon, and 65.0% oxygen?
- 4) If the molar mass of the compound in problem 3 is 73.8 grams/mole, what's the molecular formula?

Student Name: _____ Date: _____

30S Chemistry Hydrates Worksheet

Answers each question in the space provided.

- 1) How is a hydrate different from other chemical compounds?

- 2) Define the following terms:
 - anhydrate

 - dehydration

- 3) Name the following compounds:
 - a) $\text{FeCl}_3 \cdot 6 \text{H}_2\text{O}$ _____
 - b) $\text{CuSO}_4 \cdot 5 \text{H}_2\text{O}$ _____

- 4) Write the formulas for the following compounds:
 - a) barium chloride dihydrate _____
 - b) magnesium sulfate heptahydrate _____

- 5) What is the percent composition of water in the compound in problem 4b?

- 6) If 125 grams of magnesium sulfate, MgSO_4 , heptahydrate is completely dehydrated, how many grams of anhydrous magnesium sulfate will remain?

Ionic Hydrate Worksheet

Name the following hydrates:

$\text{CaCl}_2 \bullet 8 \text{H}_2\text{O}$ _____

$\text{FeSO}_4 \bullet 6 \text{H}_2\text{O}$ _____

$\text{LiOH} \bullet \text{H}_2\text{O}$ _____

$\text{PbCl}_2 \bullet 3 \text{H}_2\text{O}$ _____

$\text{Li}_2\text{CrO}_4 \bullet 5 \text{H}_2\text{O}$ _____

$\text{Na}_2\text{SO}_4 \bullet 10 \text{H}_2\text{O}$ _____

Write the formulas for the following hydrates:

Barium Phosphate dihydrate

Copper(II)sulfate pentahydrate

Cobalt chloride hexahydrate

Magnesium sulfate heptahydrate

Nickel (II) sulfate hexahydrate

Copper (I) Bromide tetrahydrate

Naming Hydrates

Write the correct numerical prefix for each of the numbers in the table

Number	Prefix
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Complete each of the following sentences by filling in the appropriate word or phrase from the list below.

Cation, hydrates, degree of hydration, anhydrous, anion

1. Ionic compounds that absorb water into their solid structures form substances called _____
2. A compound that is completely dry or "water-free" is called _____
3. When naming an ionic substance, the name of the _____ comes first, followed by the name of the _____
4. The prefix in the name of a hydrate indicates the _____