

Name _____ Block _____ Date _____

Mathematical Chemistry Notes

Moles and Molar Mass

What is a mole?

How many is a mole of anything? (Try to put units on your answer; this will help you later on.)

Based on your knowledge of a mole, what you think molar mass is? (It can relate to atoms, molecules, and ionic compounds)

Molar mass can have many names. Some of these other names include gram atomic mass, gram molecular mass, and gram formula mass. What do you think these names all refer to?

Problems

1. What is the gram atomic mass of:
 - (a) Na

 - (b) B

 - (c) Cu

2. What is the gram molecular mass of:
 - (a) H_2

 - (b) CH_4

 - (c) CO_2

3. What is the gram formula mass of:
 - (a) NaCl

 - (b) KCl

 - (c) CHCl_3

Why is the idea of knowing the molar mass of something such an important idea in science?
(Hint: Think about what the units of molar mass are.)

Problems

Consider the molecule CuNH_4Cl_3 as you answer 1-9.

1. Name the elements present.
2. How many atoms are in the molecule?
3. How many atoms of each element is in the molecule?
4. How many hydrogen atoms are in one mole of molecules?

5. How many chlorine atoms are in six moles of molecules?

6. What is the molar mass of this molecule?

7. Name this molecule.

8. What is the mass in grams of one molecule?

Consider the molecule $\text{Cu}_2\text{CO}_3(\text{OH})_2$ as you answer 9-16.

9. Name the elements present.

10. How many atoms are in the molecule?

11. How many atoms of each element is in the molecule?

12. How many hydrogen atoms in one mole of molecules?

13. How many carbon atoms in six moles of molecules?

14. What is the molar mass of this molecule?

15. Name this molecule.

16. What is the mass in grams of one molecule?

Problems

1. What is the mass of 6.5 moles of H_2O ?
2. What is the mass of 2.75 moles of C_6H_6 ?
3. What is the mass of 1.35 moles of CO_2 ?
4. What is the mass of 1.35 moles of CO_2 ?
5. How many moles of H_2 are in 5.4 g?

Name	Chemical Formula	Type of Bonding	Atom, Molecule, or Formula Unit?	GAM/GMM/GFM
	NaCl			
Sodium Carbonate				
	CaCO ₃			
Lead (IV) Nitrate				
Argon				
	CH ₄			
Nitrogen Dioxide				
	HF			
Gold				
Potassium Dichromate				
	Ag ₂ SO ₃			
	I ₂			

1. You're doing a reaction and you need 0.0100 mole of lead (II) chromate. How much should you weigh on the scale?
2. When you go into the hospital for dehydration, they often intravenously administer a colorless fluid. This colorless fluid is usually a sterile mixture of salt (NaCl) and water called saline. If there are 4.5 g of NaCl in one bag of saline, how many moles of NaCl are in the bag?
3. One day, you're at home and your mom has a headache. She would like to take an aspirin pill, but alas, all you have is aspirin in powdered form. If one pill has 1.81×10^{-3} mole in it, how much should you weigh out to give her? The molecular formula for aspirin is $C_9H_8O_4$.
4. You go over to your friend's house to go swimming. As you two are walking to the pool, he tells you that his pool can hold 2.2×10^7 g of water. You get excited because you had been wondering how many moles of water were in that pool, and now you had the information you needed to calculate it. How many moles of water are contained in you friend's pool?