

The Mole, and Percent Composition by Mass

1. A mole is a certain _____
You could have a mole of _____
2. A mole is _____ of something.
Which could be written as _____
3. _____ is Avogadro's Number, it is named for _____
4. How many atoms are in one mole of mercury? _____ atoms
5. How many atoms are in one half mole of carbon? _____ atoms
6. One atom of Hg has a weighted average mass of _____ amu from the periodic table.
7. In our class we'd round that to this nearest whole number: _____
8. 1 mole, or: 6.02×10^{23} atoms of mercury has mass of _____
9. Determine the mass of... 1.0 mole of carbon = _____
2.0 moles of aluminum _____ 3.0 moles of helium _____
0.50 moles magnesium _____
10. What's the mass of 1.0 mole of oxygen gas? _____
11. The HONCIBrIF Twins need special attention. The molar mass in grams for each is:
H₂ ____ g O₂ ____ g N₂ ____ g Cl₂ ____ g
Br₂ ____ g I₂ ____ g F₂ ____ g

12. What is the mass of one mole of magnesium oxide? (we'll figure this out soon)
- 12b. I could also have asked you, what is the molar mass of magnesium oxide?
(that means the same thing)
14. _____ of a substance = it's _____. That's vocabulary.

15. MgO

MgO has a molar mass = _____ or _____ = _____

16. An important note about the HONCIBrIF Twins, when bonded into a compound, like MgO, or as CO carbon monoxide...
-

17. CO₂

-
18. What is the mass of 2.70 moles of sulfur? (do what's below first)
19. The molar mass of sulfur is: _____
20. Which means, one mole sulfur = _____ grams of sulfur (Now do #18 below)

25A+B. NYS Regents likes vocabulary. Instead of always saying molar mass, like they could, sometimes they like to use extra words like...

Gram Molecular Mass = molar mass of _____

Or

Gram Formula Mass = molar mass of _____

26. SO₃

(one mole of this = _____ molecules SO₃)

27. Calculate the gram formula mass (molar mass) of sodium sulfate. (write formula correctly first)

28. If you have 133.2 g of Sodium sulfate, how many moles do you have?

29. How many moles of gold is 551 grams of gold?

30. 37.33 g of silicon is how many moles of silicon?

31. How many moles of zinc are in 1.25×10^{23} atoms?

32. How many moles of xenon gas are in 8.75×10^{24} atoms of Xe?

33. If you find 50.0 grams of pure silver, how many atoms of silver did you find?

Mole Class #3 Objective: _____

Review

34. One mole = _____

One mole = _____

NEW

35. One Mole ALSO = _____ *

*

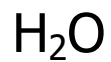
36. (MAP) don't draw ahead, listen first.

37. How many liters of neon gas are in 65.3 grams of neon? (first we look at the map and make a plan)

38. You win exactly 3.58×10^{24} atoms of aluminum in a contest. How many grams did you win? (fun prize!)

39. You find a canister labeled “exactly” 7.99×10^{25} molecules of carbon dioxide gas (CO_2).
What is the mass of this gas?

40. How do we determine the percent composition by mass of hydrogen and oxygen in water?



41. What's the percent composition by mass of sodium and chlorine in sodium chloride?



42. What's the percent composition by mass for Copper (II) sulfate?



43. So, imagine that you have a pocketful of this copper (II) sulfate, say, 456 grams.
That's just more than a pound. How many grams of your pocketful of crystals is just copper?
Or oxygen? Or sulfur?

456 g x _____ copper = _____ grams copper by mass

456 g x _____ sulfur = _____ grams sulfur

456 g x _____ oxygen = _____ grams oxygen by mass

44. There are 2 atoms of hydrogen for every one atom of oxygen. Why is the percent comp
by mass so low for hydrogen? Shouldn't this be higher?
-

45. You fill up a water balloon to 1250 mL. It's mass is also 1250 grams. How many of those
grams are just oxygen?

Water is always 89% oxygen, so: 1250 g water X _____ = _____ g oxygen
(disregarding SF here, this is conceptual)

46. What's the % composition by mass of aluminum in aluminum hydroxide monohydrate?
round answer to 3 SF
-

47. You find a box with a bar of metal that has stamped into it - *PURE GOLD*. The bar weighs 500. grams EXACTLY. How many atoms of gold do you have?
48. If you have 50.0 g of sodium hydroxide, how many grams of those are oxygen?
49. Calculate the mass of the neon in the balloon of 346 liters.

50. Empirical Formulas _____

51. The empirical formula of $C_6H_{12}O_6$ is _____

52. CH_2O _____

53. Let's practice empirical formulas now...

CHEMICAL FORMULAS	EMPIRICAL FORMULAS
$C_6H_{12}O_6$ (glucose)	
C_8H_{18} (octane)	
$C_{24}H_{48}$ (candle wax)	
C_2H_2 (acetylene gas)	
H_2O_2 (hydrogen peroxide)	
C_6H_6 (cyclohexene)	
$C_{10}H_{22}$ (decane)	
C_6H_{14} (hexane)	
$C_5H_{10}O_5$ (pentose)	

54. If you find 11.200 moles of gold and gold is selling for about \$40.39/gram, are you rich or just happy, or does it not matter all that much? (*hint, how many grams are in that many moles?*)

55. Convert 4.87×10^{24} formula units of sodium chloride to grams.

56. You have 125 grams of carbon dioxide gas in a balloon at STP. What is its volume in liters?

57. If you happen to have 888 g of copper (II) sulfate, how many FU's Cu do you have?

58. You have 67.2 g of water, how many of those grams are just hydrogen?

59. What is the percent composition by mass of nickel in the compound nickel (II) carbonate?

60. What are the empirical formulas for the following compounds?

COMPOUND NAME	CHEMICAL FORMULA	EMPIRICAL FORMULA
paraffin wax	$C_{26}H_{54}$	
ethene	C_2H_4	
decene	$C_{10}H_{20}$	
sucrose	$C_{12}H_{22}O_{11}$	
heptane	C_7H_{16}	
hydrogen monochloride		
potassium sulfite		
cobalt (II) phosphate		

61. How many electrons in a Mg^{+2} cation? Many will choose $12 e^-$ _____

62. How many electrons in the following species?

Al^{+3}	Al	Co^{+3}	Co^{+2}
Pb^{+2}	Pb^{+4}	F^{-1}	S^{-2}
N^{-3}	Au^{+1}	Au^{+3}	Cu
Cl^{-1}	Fe	Na^{+1}	Mn^{+7}