CHEMISTRY

MOLAR MASS

Mass and the Mole

The importance of Avogadro's constant is that it defines a visually quantifiable amount of all elements on the periodic table; starting with hydrogen, the smallest element.

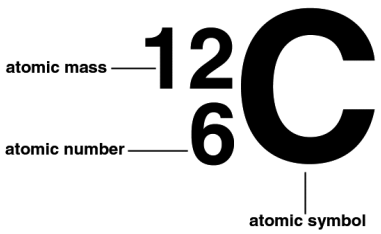
As it turns out, 1 mol of hydrogen, that is 6.022 x 10^{23} atoms, has a mass of 1 gram.

We have seen on the periodic table that each element has an atomic mass. More appropriately, this atomic mass represents the mass of 1 mol of that element; called the ***molar mass***.

For Example:

Carbon has an atomic mass of 12 according to the periodic table.

This is saying that 1 mol of carbon atoms (6.022 x 10^{23} atoms), is equal to 12 g. ***So atomic mass … is molar mass.***



6 x 1.67262178x10^{-24}g - Mass of p^+

+ 6 x 1.67262178x10^{-24}g - Mass of n^0

2.00714614x10^{-23}g - Mass of C atom

x 6.022 x 10^{-23}

12 g/mol

CHEMISTRY

MOLAR MASS

Finding the Molar Mass of Compounds

Ex. 1: *NaCl*

The molar mass of sodium is:
The molar mass of chlorine is:

The molar mass of sodium chloride is:

This is saying that 1 mol of NaCl (6.022 x 10^{23} molecules) has a mass of 58.44g.

Ex. 2: *Find the molar mass of* ***CO_2.***

CHEMISTRY

MOLAR MASS

Cheesy Chemistry Movie

CHEMISTRY

MOLAR MASS

PUTTING IT ALL TOGETHER:
Names, Formulas, and Molar Mass

1. Write the formulas and molar masses for the following compounds.

		Formula	*Molar Mass*			*Formula*	*Molar Mass*
a.	calcium fluoride			k.	potassium sulphate		
b.	carbon disulfide			l.	barium nitride		
c.	nitrogen triodide			m.	aluminum hydroxide		
d.	sodium phosphide			n.	fluorine gas		
e.	dichlorine monoxide			o.	silicon dioxide		
f.	iron (III) carbonate			p.	calcium hydroxide		
g.	sulphuric acid			q.	xenon gas		
h.	diphosphorus pentasulphide			r.	gold (I) nitrate		
i.	tin (IV) chloride			s.	sulphur trioxide		

2. Write the names and molar masses for the following compounds.

		Name	*Molar Mass*			*Name*	*Molar Mass*
a.	CCl_4			k.	$NaNO_3$		
b.	$Mg(ClO_3)_2$			l.	PCl_5		
c.	PBr_3			m.	BiF_5		
d.	H_2 gas			n.	$HClO_{3\,(aq)}$		
e.	PbS_2			o.	$FeCl_2$		
f.	$Al_2(CO_3)_3$			p.	N_2O		
g.	Na_2SO_4			q.	$CuClO_3$		
h.	Na_2O			r.	Li_3PO_4		
i.	$Al_2(SO_4)_3$			s.	SnO		

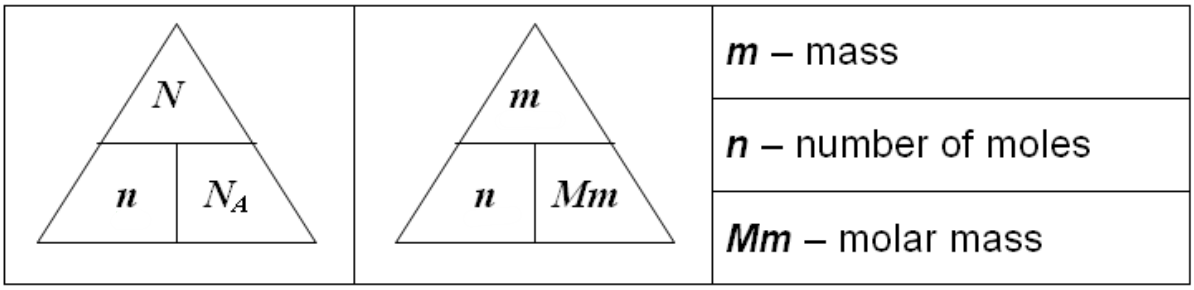
3. Can you think of a legitimate word (or name) that has a larger molar mass than this?

Ca S Li C K = 40 + 32 + 7 + 12 + 39 = 130 g/mol

CHEMISTRY

MOLAR MASS

Converting from Moles/Particles to Mass



Ex. 1: *What is the mass of 4.5 mol of lithium?*

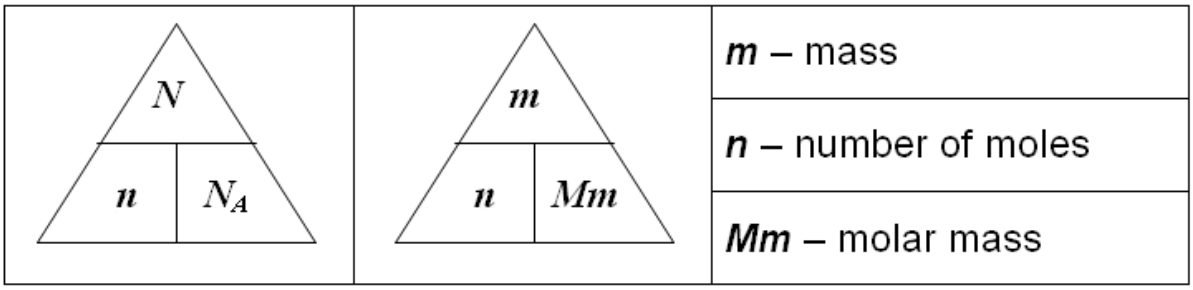
Ex. 2: *What is the mass of 2.7 mol of Al_2O_3?*

Ex. 3: *What is the mass of 1.144×10^{24} molecules of $Ca(NO_3)_2$?*

CHEMISTRY

MOLAR MASS

Converting from Mass to Moles/Particles



Ex. 1: *How many moles are there in 107.92 grams of aluminum?*

Ex. 2: *How many moles are there in 75.79 grams of MgF_2?*

Ex. 3: a) *How many molecules are there in 36.8 g of methane?*

b) *How many atoms of hydrogen are there in 36.8 g of methane?*

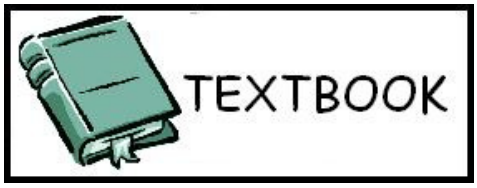
CHEMISTRY

MOLAR MASS

Homework

Pg. 237 #41 - 50

Pg. 239 #51 - 60



http://www.gecdsb.on.ca/schools/sec/brdhs/caslick/sch3utext.html

ANSWERS

41. 182 g

42. 11 g

43. 0.231 g or 231 mg

44. 5.3×10^2 mg

45. **a.** cobalt(II) nitrate 8.2×10^{-1} g
b. lead(IV) thiosulfate 1.28×10^4 g

46. **a.** NH_4NO_3 3.9×10^2 g
b. Fe_2O_3 2.59×10^3 g

47. 2.4×10^2 mg

48. 1.001 kg

49. **a.** Br_2
b. $Sr(IO_3)_2$

50. aluminum iodate

51. 1.73 mol

52. 139 mol

53. 8.75×10^{-4} mol

54. 1.1×10^{-4} mol

55. **a.** SiO_2, 6.2×10^{-5} mol
b. $Ti(NO_3)_4$, 0.08577 mol
c. $In_2(CO_3)_3$, 4.70×10^{-5} mol
d. 313 mol $CuSO_4 \cdot 5H_2O$,

56. 1.47 mol

57. 1.80×10^2 mol

58. 1.52×10^{-5} mol

59. $Al(OH)_3(s)$, $AgCl(s)$, $Ni(NO_3)_2(s)$

60. tin(IV) oxide, glucose, barium perchl