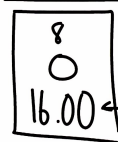


Atom (Micro/Ind. part.)

16 ← Mass #
8 ← Atomic #

Mass = 16 amu
atomic mass unit

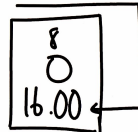


Avg Atomic Mass (amu)

Mol (Macro/groups part)

16 ← Micro - 16 amu
8 ← Macro - 16 g*

Mass atom $\xrightarrow[\text{Avogadro's \#}]{N_A}$ Mass | mol



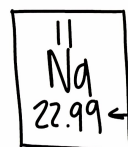
Avg. # = 6.022×10^{23} part/mol
Molar Mass (g/mol)*

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Molar Mass

Mass | mol part.
mass N_A part.

Individual Atom



Molar Mass
22.99 g/mol

Binary Molecule/Compound

$X_a Y_b : aX + bY$
a and b are # atoms

Polyatomic Compound/Acid/Base

$X_a (Y_b Z_c)_d : aX + (b \cdot d)Y + (c \cdot d)Z$

Hydrates

$X_a Y_b \cdot D H_2O : aX + bY + D \cdot 18.02$
H₂O

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Solvation: Making a solution (inc. mixtures)

Solution (homogenous)
[one phase]

Solute: small added

Solvent: large

Solution: solute + solvent

Mixture: heterogeneous (two phase)
solution

Solution



Mixture



Ionization (in water)

Ionic (aqueous soln)
 $XY \rightarrow X^+ + Y^-$

acid (H⁺)

$HY \rightarrow H^+ + Y^-$

base (OH⁻)

$XOH \rightarrow X^+ + OH^-$

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Molarity and Dilutions

Molarity (molar solution)

Molarity = $\frac{\text{mol solute}}{V_{\text{soln}}}$

$V_{\text{soln}} = L$ Molarity = mol/L

Relationship (direct)

$\frac{\text{mol} \uparrow}{V_{\text{soln}} \uparrow} \quad \frac{\text{mol} \downarrow}{V_{\text{soln}} \downarrow}$

Modify Solution

$M_1 V_1 = M_2 V_2$
start final

Relationships (Ind)

$M \uparrow V \downarrow \quad M \downarrow V \uparrow$
[V ↑, dilution, V ↓ conc.]

(Dilution/Concentration)

$M_1 = \frac{M_2 V_2}{V_1}$

$V_1 = \frac{M_2 V_2}{M_1}$

$M_2 = \frac{M_1 V_1}{V_2}$

$V_2 = \frac{M_1 V_1}{M_2}$

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