Empirical and molecular formulae, percentage composition

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Mass percent of an element	(atoms x atomic mass / molar mass) x 100 Valid when: pure compound with known formula and atomic masses	percent
Moles from percentage (per 100 g)	n = percent / atomic mass Valid when: composition given as mass percent; basis of 100 g	mol per 100 g
Empirical formula ratio	divide all n by the smallest; multiply to clear 1.5, 1.33, 1.67, 1.25 Valid when: ratios close to simple fractions like 1.5 or 1.33	whole numbers
Multiplier for the molecular formula	n = molar mass / empirical formula mass Valid when: molar mass of the compound is known	dimensionless integer
Carbon from CO2	m(C) = (12 / 44) x m(CO2) Valid when: complete combustion; all carbon ends as CO2	g
Hydrogen from H2O	m(H) = (2 / 18) x m(H2O) Valid when: complete combustion; all hydrogen ends as H2O	g
Oxygen by difference	m(O) = m(sample) - m(C) - m(H) Valid when: compound has only C, H and O; sample mass known	g
Water of crystallisation	x = moles of H2O / moles of anhydrous salt Valid when: hydrate heated until all water is lost	dimensionless

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/chemistry/some-basic-concepts-of-chemistry/empirical-and-molecular-formulae-

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