CHEMISTRY FORMULA CHEAT SHEET

Molar Mass · Moles · pH · Ideal Gas Law — keep this next to your homework

1 · MOLAR MASS (M)

$$M = \Sigma \text{ (count} \times \text{atomic mass)}$$

Unit: **g/mol** — the mass of one mole of particles.

Subscripts multiply an element; a subscript after parentheses multiplies **everything** inside.

Mass % = element subtotal ÷ M × 100 — in water, oxygen is **88.8%** of the mass.

Example: $Ca(OH)_2$ = 40.08 + 2×(16.00 + 1.008) = **74.09 g/mol**

2 · MOLE CONVERSION

$$n = m / M \quad m = n \times M$$

particles = n × 6.022×10^{23} (Avogadro)

Moles are the hub of stoichiometry: balanced equations speak in moles, the balance reads grams.

Tip: convert to **moles first**, then to whatever the question asks for.

Example: 36 g H_2O ÷ 18.02 g/mol = **2.00 mol** ≈ 1.2×10^{24} molecules

3 · pH & pOH (25 °C)

$$pH = -\log_{10}[H_3O^+]$$
$$pH + pOH = 14$$

$[H_3O^+] = 10^{-pH}$ · $pOH = -\log_{10}[OH^-]$

pH < 7 acidic · 7 neutral · > 7 basic — each unit is a **tenfold** change in acidity.

Kw trick: $[OH^-] = 1.0\times10^{-14} \div [H_3O^+]$

Example: $[H_3O^+]$ = 0.005 M → pH = **2.30** (acidic)

4 · IDEAL GAS LAW

$$PV = nRT$$
$$R = 0.08206 \text{ L·atm/(mol·K)}$$

T(K) = °C + 273.15 · P = nRT/V · V = nRT/P · n = PV/(RT) · T = PV/(nR)

Ideal = negligible particle volume, no intermolecular forces.

Example: 1 mol at 273.15 K, 1 atm → V = **22.41 L** (molar volume, same for every gas)

Handy numbers: molar volume 22.41 L · Avogadro 6.022×10^{23} /mol · $K_w = 1.0\times10^{-14}$ · R = 8.314 kPa·L/(mol·K) · lemon pH 2 · water 7 · blood 7.4 · ammonia 11

Moles are always the hub: mass → moles → particles

Interactive calculators with step-by-step breakdowns: chem.chuliudev.com