

Every table links straight to the formula that uses it, plus the one detail students most often miss. Pair this with topical practice — it's a lookup tool, not a substitute for understanding the chemistry.

Data Booklet → Formula → Final Check

Area	Formula / Data	Final Check
Gas calculations	$pV = nRT$ or $n = V \div V_m$	Use Pa, m ³ , K — check s.t.p. vs r.t.p.
Particles	$N = nL$	Atoms, molecules, ions, or electrons?
Calorimetry	$q = mc\Delta T$	Consistent units; decide sign of ΔH
Bond energies	$\Delta H \approx \Sigma \text{ broken} - \Sigma \text{ formed}$	Count every bond; apply coefficients
Electrode potentials	$E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$	Never multiply E° values
Electrochemical energy	$\Delta G^\circ = -nFE^\circ_{\text{cell}}$	Use balanced electron transfer for n
Electrolysis	$Q = It$, $n(e^-) = Q \div F$	Convert time to seconds first
Aqueous equilibria	$K_w = [H^+][OH^-]$	Confirm the stated temperature
Ionisation energies	Trends and large jumps	Support with charge, shielding, distance
Bond and ionic radii	Compare like with like	Use charge, shell number, attraction
¹ H NMR	Match δ ranges to environments	Combine with integration and splitting
Infra-red	Match diagnostic ranges	Use several peaks and key absences
Aromatic orientation	Existing group controls position	Separate orientation from activation
Qualitative analysis	Reagent, observation, excess behaviour	State colours and final solutions precisely
Periodic Table	Printed proton numbers and A_r values	Avoid premature rounding

Formulae You Must Still Know (Not in the Booklet)

The booklet gives constants and reference values — these relationships still need to be recalled or constructed from scratch.

- Amount from mass: $n = m \div M$
- Concentration: $c = n \div V$
- Ideal gas: $pV = nRT$
- Gas amount at stated conditions: $n = V \div V_m$
- Particles: $N = nL$
- Heat change: $q = mc\Delta T$
- Bond energy estimate: $\Delta H \approx \Sigma(\text{broken}) - \Sigma(\text{formed})$
- Gibbs free energy: $\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$
- K_c / K_p expressions — built from the balanced equation
- Acids: $pH = -\lg[H^+]$, $K_a = [H^+][A^-] \div [HA]$, $pK_a = -\lg K_a$
- Bases: $K_b = [BH^+][OH^-] \div [B]$, $pK_b = -\lg K_b$
- Water: $K_w = [H^+][OH^-]$, and $K_w = K_a K_b$ for a conjugate pair
- K_{sp} — built from the dissolution equation
- $E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$
- $\Delta G^\circ = -nFE^\circ_{\text{cell}}$
- $Q = It$, $n(e^-) = Q \div F$, $F = Le$

Common Data Booklet Mistakes — Final Check Before You Submit

- ☐ Treating the booklet as a substitute for formula recall
- ☐ Using $24 \text{ dm}^3 \text{ mol}^{-1}$ without checking if the gas is at r.t.p.
- ☐ Substituting cm^3 or dm^3 directly into $pV = nRT$
- ☐ Calculating bond energies as formed minus broken
- ☐ Multiplying E° values when balancing half-equations
- ☐ Assuming a positive E° cell guarantees a fast, visible reaction
- ☐ Identifying an organic compound from a single spectroscopy peak
- ☐ Ignoring whether a precipitate dissolves in excess reagent
- ☐ Stating an ionisation-energy trend without explaining nuclear charge, shielding and distance
- ☐ Rounding relative atomic masses too early

Want help applying this under exam conditions?

H2 Chemistry tuition at Pamela's Place — small Omakase groups, capped at 7 students. Read the full Data Booklet guide at pamelasplace.com.sg/h2-chemistry-data-booklet-guide/