Final Exam Review

A roadmap to the general-chemistry final: the problem families to recognize, method cues, a readiness checklist, cross-topic traps, and a few topics beyond the assessed strands. Pointers are to the numbered ChemWhiz topic sheets.

01 The seven problem families — REFERENCE

Family	What it tests → sheets
Quantitative foundations	measurement, mole/formula, stoichiometry, solutions → 1, 8, 10, 9, 11
Thermochem & thermodynamics	calorimetry, Hess, entropy/free energy → 16, 25
Kinetics & gas equilibrium	rate laws, integrated rates, K/Q/ICE → 20, 21, 17
Aqueous equilibria	acid-base, buffers, titration, Ksp → 22, 23, 24
Electrochemistry & redox	balancing, E°cell, Nernst, electrolysis → 7, 26
Atomic, bonding & IMF	structure, periodicity, VSEPR, IMFs → 3, 12, 13, 14, 15, 18
Coordination & crystal field	naming, CN/ox state, d-count, magnetism → 27

02 If the question gives X, use Y — METHOD

If it gives…	reach for…
amounts of TWO reactants	limiting reactant, then work from it (10)
% composition + molar mass	empirical → molecular formula (8)
ΔH and ΔS, asks 'spontaneous?'	ΔG = ΔH − TΔS; sign + crossover T (25)
a rate-vs-concentration table	method of initial rates (20)
K + initial amounts	check Q vs K, then an ICE table (21)
a weak acid with its conjugate	Henderson-Hasselbalch (23)
Ksp with a common ion	ICE with the common ion in the initial row (24)
a cell at nonstandard concentrations	Nernst equation (26)
current × time for a deposit	charge → mol e^- (Faraday) → mass (26)
electron domains on a central atom	VSEPR shape, then polarity (15)

03 Final-exam readiness (do these cold) — CORE RULE

Balance any equation and run a mass → mole → mole → mass chain; convert freely between M, m, %, ppm, and a dilution.

Set up an ICE table and pick the right constant (Kc/Kp, Ka/Kb, Ksp); use Q vs K to call the direction.

Balance a redox half-reaction and convert among E°cell, ΔG°, and K.

Go formula → Lewis structure → VSEPR shape → polarity → dominant intermolecular force.

04 Common cross-topic traps — WATCH OUT

Carry sig figs and units to the end; 22.4 L/mol is a gas-only STP shortcut (0 °C, 1 atm), not for liquids/solids.

Reaction orders come from experiment, not the coefficients (except for an elementary step).

A weak-acid/base titration equivalence point is NOT pH 7 (> 7 for weak acid + strong base, < 7 for weak base + strong acid); get it from the salt's hydrolysis.

Mind the signs (exothermic ΔH < 0; spontaneous ΔG < 0 / E°cell > 0), and use kelvin wherever absolute T appears (gas law, Arrhenius, K, ΔG).

05 Additional course topics to review — REFERENCE

Beyond the seven assessed strands	sheet
Nuclear chemistry: decay modes, balancing nuclear equations, half-life kinetics	→ 28
Main-group chemistry: descriptive periodic trends and properties by group	→ 29