Chemistry

HSC · 2017 SYLLABUS · STUDENT GUIDE

Where the marks are: HSC Chemistry 2027

What the eight HSC Chemistry papers from 2019 to 2026 show, and how to use it in your revision

9 dot points carried **316 of the 800 marks**. They are Priority 1 and 2 below.	**1 in 3** marks is on a part that needs a **calculation**: 30–42 marks in every paper.	**58%** of marks come with a **graph, table or diagram**, often a spectrum or a structure.	**2** parts worth **7–9 marks** in every paper, most built on data you are given.

How to use this guide

1. **Start with Priority 1 and 2.** Tick a box only when you can do unseen past-paper or teacher-set questions on it for full marks.
2. **Then Priority 3** and the organic reactions map you build on page 2, then the eight never or hardly examined ideas on page 3.
3. **Keep the rest of Modules 5 to 8 in your plan.** About half of each recent paper came from outside the top 15.

Priority 1: examined in every paper

These 5 dot points have been the main focus of a question in all 8 papers.

Dot point	You should be able to	Papers
☐ **Spectroscopy of organic compounds** M8.IQ2.DP2	Draw a structure from NMR, mass and infrared spectra, linking each peak to part of the molecule; predict the spectra of a given structure.	**8/8**
☐ **Titration** M6.IQ3.DP1	Do a whole titration calculation from raw titres, including a back titration, leaving out any outlier titre.	**8/8**
☐ **Solubility product, K_{sp}** M5.IQ4.DP4	Write a K_{sp} expression; go from solubility to K_{sp} and back, including when one of the ions is already in the solution.	**8/8**
☐ **Le Chatelier's principle** M5.IQ2.DP1	Predict and explain what happens to each substance when temperature, concentration, volume or pressure changes.	**8/8**
☐ **Naming organic compounds** M7.IQ1.DP1	Name and draw compounds up to eight carbons, with branches and halogens, from alkanes through to amides.	**8/8**

Priority 2: examined in 7 of 8 papers

Each missed only one paper as a main focus.

Dot point	You should be able to	Papers
☐ **K_{eq} calculations** M5.IQ3.DP2	Find K_{eq} or an equilibrium concentration from a table of amounts, and use Q to say which way a reaction will go.	**7/8**
☐ **Testing for ions** M8.IQ1.DP2	Plan flame, precipitation and complexation tests in a sensible order to identify ions, with observations and the equations asked for.	**7/8**
☐ **Colourimetry, UV-visible and AAS** M8.IQ1.DP4	Read a calibration curve to find a concentration, keeping track of every dilution, and choose the right technique.	**7/8**
☐ **Buffers** M6.IQ3.DP7	Explain with an equation how a buffer absorbs added acid or base, and why it eventually stops working.	**7/8**

Priority 3: the rest of the top 20

A main focus in 3 to 6 of the 8 papers, usually for several marks when they appear.

Dot point	You should be able to	Papers
☐ **K_a and pK_a** M6.IQ3.DP4	Calculate K_a or pK_a from a concentration and pH, or from a titration curve, and use them to rank acids by strength.	**6/8**
☐ **Gravimetric analysis, precipitation titration** M8.IQ1.DP3	Calculate a concentration from the mass of a precipitate or from a precipitation titration; suggest how to improve the method.	**5/8**
☐ **Designing a chemical synthesis** M8.IQ3.DP1	Weigh up availability of reagents, conditions, yield and purity, and environmental, social and economic issues in designing a synthesis.	**5/8**
☐ **Enthalpy of neutralisation** M6.IQ1.DP5	Use $q = mc\Delta T$ and the moles of water formed to find the enthalpy of neutralisation, and describe how to collect the data.	**4/8**
☐ **Reaction pathways** M7.IQ5.DP6	Complete a reaction pathway: the structure at each step, and the reagent and conditions on each arrow.	**3/8**
☐ **Enthalpy, entropy and ΔG** M5.IQ1.DP3	Calculate $\Delta G = \Delta H - T\Delta S$ and use it, with enthalpy and entropy, to say whether a reaction is spontaneous.	**5/8**
☐ **Dissociation and conjugate pairs** M6.IQ2.DP4	Write ionic equations for acids and bases in water; identify conjugate pairs and show a species is amphiprotic.	**6/8**
☐ **Collision theory and equilibrium** M5.IQ2.DP2	Use collision theory to explain why rates change and how a system reaches a new equilibrium.	**4/8**
☐ **Enthalpy of combustion of alcohols** M7.IQ4.DP3	Calculate the enthalpy of combustion of an alcohol from experimental data, and explain why it differs from the published value.	**4/8**
☐ **Properties of acids, amines and amides** M7.IQ5.DP2	Explain boiling points and solubility of acids, amines and amides using hydrogen bonding, dipole and dispersion forces.	**5/8**
☐ **Titration and conductivity curves** M6.IQ3.DP2	Read a titration or conductivity curve: strong or weak, where the equivalence point is, and why the curve has its shape.	**6/8**

Expect organic reactions, in pieces

Reactions of alkenes, alcohols, acids and esters are spread over seven small dot points, so only reaction pathways makes the list above. Together they carried **6–16 marks in every paper**. Build one map linking alkanes, alkenes, alkynes, haloalkanes, alcohols, aldehydes, ketones, carboxylic acids and esters, with the reagent and conditions on every arrow, and practise redrawing it from memory.

Skills that come up every year

- **Use the information you are given:** 61–83 marks per paper are on parts where you must use a table, graph, spectrum or numbers in the question.
- **Write balanced equations** with states: 8–19 marks per paper sit on parts that need one.
- **Draw a graph and use it** (7 of the 8 papers): a column graph for categories, a line or curve of best fit for measurements, a sensible scale, labelled axes.
- **Plan or judge a method** (19 marks in 2026): describe how to collect the data, justify the conditions and safety steps, or say what further test is needed.

Don't get caught out

watch this space

We checked every question, marking guideline and sample answer from 2019 to 2026. These are in the syllabus but have never or hardly been asked, and only the 2027 and 2028 papers remain. Most need only an example and a few sentences.

	Never examined	What to know
☐	**Buffers in natural systems** M6.IQ3.DP8	One natural buffer, such as carbonic acid and hydrogencarbonate in blood: its equation, and why a steady pH matters.
☐	**Everyday and industrial uses of neutralisation** M6.IQ1.DP4	Two uses with equations: an antacid, lime on acidic soil, or correcting the pH of waste water.
☐	**Static equilibrium** M5.IQ1.DP2	Static: both forward and reverse processes have stopped. Dynamic: forward and reverse reactions continue at equal rates, so amounts stay constant.
	Hardly examined	
☐	**Soaps and detergents** M7.IQ5.DP5	A water-loving head (charged in soap) and a hydrocarbon tail that mixes with grease; how micelles form. Two multiple-choice marks so far.
☐	**Removing toxins from foods** M5.IQ4.DP2	How Aboriginal and Torres Strait Islander Peoples use leaching in running water, explained as a solubility equilibrium.
☐	**Acid/base techniques of Aboriginal and Torres Strait Islander Peoples** M6.IQ3.DP5	One example your class has studied and the acid–base chemistry behind it. No acid–base question on this yet.
☐	**Testing for iron(II) ions** M8.IQ1.DP2	Fe^{2+} gives a green precipitate with hydroxide ions; Fe^{3+} gives a brown one. No question has yet asked you to identify Fe^{2+}.
☐	**Why we monitor the environment** M8.IQ1.DP1	Why ions such as lead and phosphate are tested for in water, and why both qualitative and quantitative tests are needed.

What markers reward

- **Use what you are given.** Read values from the graph or spectrum and say which you used.
- **Label your working.** Say what each line finds, use the mole ratio, keep units, round once at the end.
- **Name the species.** Which ions or molecules change, and why. "Le Chatelier's principle" alone explains nothing.
- **Balance equations** and include states and charges.
- **Draw clearly.** Four bonds on every carbon in a structure; make O, C, H and N unmistakable.

Don't mix these up

Markers have reported each of these. Can you explain the difference?

- pH and pOH
- K_{sp} and K_{eq} expressions
- equilibrium position and the value of K_{eq}
- equal rates and equal concentrations
- molar solubility and ionic product
- intermolecular forces and covalent bonds
- hydroxyl group and hydroxide ion
- base peak and molecular ion peak
- accuracy and reliability

A word of caution

These are patterns in past papers, not knowledge of the 2027 paper. When each paper from 2022 to 2026 was predicted from the ones before it, the top 15 dot points covered 42–58 of its 100 marks. Don't bank on a topic being "due": one missing from the last paper came back less often (44%) than one that appeared (71%). NESA can examine any dot point, so use this guide to decide what to do first, not what to skip.

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