



CHELTENHAM
LADIES'
COLLEGE

SIXTH FORM ENTRY IN SEPTEMBER 2024

CHEMISTRY

Chemistry topics and concepts that we would hope most SFC entrance candidates will have met by the time they take the autumn entrance papers. The same material will be tested for both A level and IB candidates.

Fundamental ideas

- chemical and physical changes
- elements, compounds and mixtures
- methods of separating mixtures
- constructing symbol equations
- balancing symbol equations
- state symbols

The kinetic (particle) theory of matter

- explain the differences between the three states of matter
- explain processes such as changes of state, diffusion and dissolving

Rates of reaction

- how rate is affected by factors such as concentration, temperature, surface area of solids and catalysts
- plotting graphs of rate information
- interpreting graphs of rate information
- using the collision theory and kinetic theory to explain why certain factors affect reaction rate

Metals and non-metals

- differences in physical properties
- uses related to properties
- the acidic or basic nature of metal oxides and non-metal oxides

Atomic structure, bonding and properties

- the structure of atoms, including isotopes and relative atomic mass determination
- ionic, covalent and metallic bonding
- properties of substances related to their type of structure and bonding

The periodic table

- why the elements are arranged the way they are
- using the position of an element in the table to predict its properties
- chemistry of Group 1, chemical and physical properties of the alkali metals
- Halogen chemistry, key reactions and physical properties
- basic ideas of Group 0

The reactivity series

- typical reactions used to determine the order of reactivity of metals (including carbon and hydrogen)
- competition and displacement reactions

Redox reactions

- definitions of oxidation and reduction (loss / gain of electrons or gain / loss of oxygen)
- recognising when these reactions occur
- ionic half equations for simple redox reactions

Extraction of metals

- obtaining a metal from a metal compound is a redox process
- what determines the method of reduction used for different metals
- why metals such as iron, aluminium and copper are so widely used
- why recycling is important

Electrolysis

- basic principles and definitions
- electrolysis of simple binary ionic compounds in (l) and (aq) conditions such as NaCl, CuSO₄
- electrolysis of acidified water

Chemical analysis

- tests for hydrogen, oxygen, carbon dioxide, chlorine and water
- flame test for cations
- sodium hydroxide test for cations
- tests for anions such as chloride, sulphate, carbonate
- test for ammonium ions

Calculations

- relative formula mass
- finding percentage by mass of an element in a compound, water of crystallisation in a hydrated salt, or an impurity in a mixture
- the mole
- calculating empirical formula
- calculating masses of substances needed or formed in a reaction given the mass of another reagent used or product formed
- calculations involving molar volumes of gases
- calculations involving the solubility of salts, using the units g/100g(H₂O)
- calculations involving concentrations of solutions

Acids, bases and salts

- typical reactions of dilute acids, and equations for these reactions
- methods of forming salts
- pH scale and indicators
- solubility of salts

Energy Changes in reactions

- understanding the terms exothermic and endothermic
- calculations involving heat changes using $q = mc\Delta T$

Key Practical Techniques*

- measuring temperature using a thermometer
- measuring volumes using measuring cylinders, burettes and pipettes
- measuring or collecting gases
- heating over a Bunsen burner
- separation techniques
 - filtration
 - chromatography
 - distillation
- Measuring reaction rates using
 - Gas collection
 - Mass loss
 - Effervescence
 - Colour change/appearance
 - Loss of reactant

*other techniques may be presented in questions

It should be noted that the entrance paper aims to be more a test of potential than a test of memory.

We will be looking for

- *sound basic chemical ideas and skills*
- *recognition of trends and patterns*
- *a reasonable range of knowledge –we understand that candidates are unlikely to have covered all topics mentioned above*
- *the ability to use and interpret data provided*
- *ability to plot and interpret graphs*
- *reasoning ability*
- *numerical skill*
- *some understanding of the way scientific investigations are carried out*
- *how to ensure precise and accurate measurements*
- *how to ensure the evidence obtained is valid and reliable*