School Connect Online

SCO INTERNATIONAL OLYMPIAD

GRADE 9 CHEMISTRY

OFFICIAL SYLLABUS

SCO International Chemistry Olympiad

Designed for Grade 9 learners and aligned with SCO International Chemistry Olympiad preparation.
Covers Matter in Our Surroundings, Pure Substances & Mixtures, Atoms and Molecules, and Atomic Structure.
Global reference orientation: particle models, evidence-based enquiry, data interpretation, and chemistry reasoning.

Matter	Mixtures	Atoms	Molecules	Chemistry
States	Separation	Formulae	Ions	Reasoning

SCO International Chemistry Olympiad - Class 9 Official Syllabus

Chapter-wise learning notes, outcomes, assessment focus, and teacher guidance

Programme Purpose

- Build a strong conceptual foundation in particles, pure substances, mixtures, atoms, molecules, and atomic structure.
- Develop scientific reasoning through observation, evidence, calculation, model-based explanation, and simple data interpretation.
- Prepare students for global science assessments by connecting chemistry concepts with real-life materials, environment, and laboratory practice.

Exam Snapshot

Field	Description
Exam Name	SCO International Chemistry Olympiad
Grade / Class	Class 9
Duration	60 minutes
Question Type	Objective / MCQ with reasoning, case study, data interpretation, and achiever-level items
Recommended Question Distribution	Matter: 25%; Purity & Mixtures: 25%; Atoms & Molecules: 25%; Structure of Atom: 25%
Skills Assessed	Concept recall, application, data interpretation, model-based reasoning, formula use, scientific literacy

Global Academic Alignment

Alignment Basis

- NGSS-style matter learning emphasizes models of atomic composition, molecular-level explanations, and evidence-based enquiry.
- Cambridge IGCSE Chemistry covers elements, compounds, mixtures, atomic structure, proton number, mass number, electronic configuration, and isotopes.
- ACS middle-school chemistry resources emphasize atoms, molecules, states of matter, dissolving, periodic ideas, and chemical change through student-friendly investigations.
- OECD/PISA science literacy emphasizes explaining phenomena scientifically, evaluating enquiry, and interpreting scientific data and evidence critically.

Chapter-wise Syllabus

Chapter No.	Chapter Name	Small Notes for Learning	Learning Outcomes
1	Matter in Our Surroundings	Particle nature of matter, states of matter, diffusion, temperature, pressure, changes of state, latent heat, evaporation and cooling.	Explain matter using the particle model; compare solids, liquids and gases; predict effects of temperature, pressure, surface area, humidity and wind on state changes and evaporation.

2	Is Matter Around Us Pure?	Pure substances, elements, compounds, homogeneous and heterogeneous mixtures, solutions, suspensions, colloids, concentration and separation methods.	Classify materials accurately; identify solution/suspension/colloid properties; select appropriate separation techniques; calculate simple mass percentage concentration.
3	Atoms and Molecules	Laws of chemical combination, Dalton's atomic theory, symbols, formulae, valency, ions, atomic mass, molecular mass and mole idea.	Use symbols and formulae correctly; apply valency/charge balance; calculate molecular mass and simple mole relationships; connect formulae with particle-level meaning.
4	Structure of the Atom	Electron, proton and neutron; Thomson, Rutherford and Bohr models; shells; atomic number; mass number; isotopes and isobars.	Describe atomic structure; interpret atomic and mass numbers; write basic electronic configurations; distinguish isotopes/isobars; explain evidence from atomic models.

1. Matter in Our Surroundings

Core Learning Notes

- Matter as particles: small size, spaces, motion and attraction.
- States of matter: shape, volume, compressibility, density and diffusion.
- Change of state: melting, freezing, boiling, condensation, sublimation and deposition.
- Latent heat and why temperature can remain constant during a state change.
- Evaporation: surface area, temperature, humidity, wind speed and cooling applications.

Learning Outcomes

- Draw and interpret simple particle diagrams.
- Use observation to explain diffusion and change of state.
- Apply evaporation concepts to daily-life examples such as sweating and drying clothes.

2. Is Matter Around Us Pure?

Core Learning Notes

- Elements, compounds and mixtures; physical vs chemical combination.
- Types of mixtures: solution, suspension and colloid; Tyndall effect.
- Concentration of a solution: mass by mass percentage and simple interpretation.
- Separation: filtration, evaporation, crystallisation, sublimation, centrifugation, chromatography, distillation and fractional distillation.
- Everyday examples: air, soil, salt water, milk, smoke, alloys and inks.

Learning Outcomes

- Classify materials using evidence.
- Choose separation methods based on particle size, solubility, magnetism, volatility and boiling point.
- Detect common misconceptions such as “clear means pure”.

3. Atoms and Molecules

Core Learning Notes

- Law of conservation of mass and law of constant proportions.
- Dalton’s atomic theory and modern limitations at a grade-appropriate level.
- Symbols of elements, formulae of compounds and valency/charge balancing.
- Atomic mass, molecular mass and formula unit mass.
- Mole concept as a counting unit and Avogadro constant introduction.

Learning Outcomes

- Write formulae such as $MgCl_2$, Al_2O_3, Na_2O and $CaCO_3$.
- Calculate molecular mass using given atomic masses.
- Use simple mole relationships without overloading advanced stoichiometry.

4. Structure of the Atom

Core Learning Notes

- Discovery and properties of electron, proton and neutron.
- Thomson model, Rutherford scattering and nuclear model, Bohr shells.
- Atomic number, mass number, ions, isotopes and isobars.
- Electronic configuration up to the first 20 elements at an introductory level.
- Connection between valence electrons and basic chemical behaviour.

Learning Outcomes

- Determine protons, neutrons and electrons from atomic data.
- Explain Rutherford’s evidence and Bohr shell arrangement.
- Distinguish isotopes from isobars and predict simple ion formation.

Pedagogy and Classroom Implementation

For Teachers and Schools

- Use particle diagrams before symbolic equations so students connect visible observations with invisible particle explanations.
- Include short investigations: diffusion in water, evaporation rate comparisons, filtration/evaporation of salt-sand mixtures, chromatography of ink.
- Ask students to justify why wrong options are wrong; this improves scientific language and misconception correction.
- Use data tables and simple calculations to prepare students for global evidence-based science assessments.
- Maintain safety rules: no tasting, no direct smelling, careful heating, goggles where needed, labelled samples, and teacher supervision.

Student Preparation Roadmap

Stage	Student Action	Teacher/Parent Support
Foundation	Read notes and create concept cards for definitions, examples and formulae.	Check vocabulary: element, compound, mixture, atom, molecule, isotope, shell.
Practice	Solve MCQs chapter-wise; record mistakes in a chemistry error log.	Ask the student to explain the evidence behind each answer.
Application	Attempt case-study and data questions using tables, diagrams and simple calculations.	Encourage multi-step reasoning, not guessing.
Final Revision	Revise formulas, separation methods, particle diagrams and atomic-number/mass-number problems.	Use timed practice and review answer explanations.

Reference Orientation for Curriculum Review

Global Reference Orientation

- NGSS: matter models, atomic composition, particle behaviour and evidence-based enquiry.
- Cambridge IGCSE Chemistry 0620: elements, compounds, mixtures, atomic structure, proton number, mass number, electronic configuration and isotopes.
- ACS Middle School Chemistry: atoms, molecules, states of matter, dissolving, periodic ideas and chemical change.
- OECD/PISA Science Literacy: explaining phenomena, evaluating enquiry and interpreting evidence.