CHEMISTRY

Our Expectations

The broad aims of the Chemistry Curriculum are to enable students to:

- develop interest and maintain a sense of wonder and curiosity about chemistry;
- construct and apply knowledge of chemistry, and appreciate the relationship between
- chemistry and other disciplines;
- appreciate and understand the evolutionary nature of science;
- develop skills for making scientific inquiries;
- develop the ability to think scientifically, critically and creatively, and solve problems
- individually and collaboratively in chemistry-related contexts;
- discuss science-related issues using the language of chemistry;
- make informed decisions and judgements on chemistry-related issues;
- develop open-mindedness, objectivity and pro-activeness;
- show appropriate awareness of working safely;
- understand and evaluate the social, ethical, economic, environmental and technological
- implications of chemistry, and develop an attitude of responsible citizenship.

The overarching aim of the Chemistry Curriculum is to provide chemistry-related learning experiences for students to develop scientific literacy, so that they can participate actively in our rapidly changing knowledge-based society, prepare for further studies or careers in fields related to chemistry, and become lifelong learners in science and technology.

The table shows the topics and time allocations for the Chemistry Curriculum.

Compulsory Part (Total 198 hours)

a. Planet earth* (8 hours)
b. Microscopic world I* (24 hours)
c. Metals* (22 hours)
d. Acids and bases* (27 hours)
e. Fossil fuels and carbon compounds* (20 hours)
f. Microscopic world II* (8 hours)
g. Redox reactions, chemical cells and electrolysis* (26 hours)
h. Chemical reactions and energy* (9 hours)
i. Rate of reaction (9 hours)
j. Chemical equilibrium (10 hours)
k. Chemistry of carbon compounds (27 hours)
l. Patterns in the chemical world (8 hours)

Elective Part (Total 52 hours, select any 2 out of 3)

m. Industrial chemistry (26 hours)

n. Materials chemistry (26 hours)

o. Analytical chemistry (26 hours)

Investigative Study (20 hours)

p. Investigative study in chemistry

The table shows the topics and time allocations for the Combined Chemistry Curriculum.

I Planet Earth (8 hours)

a. The atmosphere

b. The ocean

c. Rocks and minerals

II Microscopic World (21 hours)

a. Atomic structure

b. The Periodic Table

c. Metallic bonding

d. Structures and properties of metals

e. Ionic and covalent bond

f. Structures and properties of giant ionic substances

g Structures and properties of simple molecular substances

h. Structures and properties of giant covalent substances

i. Comparison of structures and properties of important types of substances

III Metals (22 hours)

a. Occurrence and extraction of metals

b. Reactivity of metals

c. Reacting masses

d. Corrosion of metals and their protection

IV Acids and Bases (28 hours)

a. Introduction to acids and alkalis

b. Indicators and pH

c. Strength of acids and alkalis

d. Salts and neutralisation

e. Concentration of solutions

f. Volumetric analysis involving acids and alkalis

g. Rate of chemical reaction

V Fossil Fuels and Carbon Compounds (23 hours)

a. Hydrocarbons from fossil fuels

b. Homologous series, structural formulae and naming of carbon compounds

c. Alkanes and alkenes

d. Alcohols, alkanoic acids and esters

e. Addition polymers and condensation polymers

VI Redox Reactions, Chemical Cells and Electrolysis (26 hours)

a. Chemical cells in daily life

b. Reactions in simple chemical cells

c. Redox reactions

d. Redox reactions in chemical cells

e. Electrolysis

f. Importance of redox reactions in modern ways of living

VII Chemical Reactions and Energy (7 hours)

a. Energy changes in chemical reactions

b. Standard enthalpy change of neutralisation, solution, formation and combustion

c. Hess's Law

Scientific Investigations

Simple investigations are subsumed in the lesson time suggested for each topic.

Subtotal: 135

<u>Language Policy</u>

English is the medium of instruction.

Learning Outcomes

The learning outcomes of the curriculum are categorised into three domains: knowledge and understanding, skills and processes, and values and attitudes.

1. Knowledge and Understanding

Students are expected to:

- understand phenomena, facts and patterns, principles, concepts, laws and theories in chemistry;
- learn chemical vocabulary, terminology and conventions;
- appreciate applications of chemistry in everyday life;
- understand methods used in scientific investigations.

2. Skills and Processes

(1) Scientific thinking

Students are expected to:

- identify patterns and changes in the natural world, and predict trends from them;
- appreciate the fundamental role of models in exploring phenomena, and that
- models are modified as new or conflicting evidences are found;
- examine evidence and apply logical reasoning to draw valid conclusions;
- examine theories and concepts using logical reasoning and experimentation;
- integrate new concepts into their existing knowledge framework, and apply them to new situations.

(2) Scientific method, scientific investigations and problem solving

Students are expected to:

- identify scientific, social, technological and environmental problems and ask relevant questions;
- identify assumptions, concepts and theories related to a problem posed;
- propose hypotheses and devise methods to test them;
- identify dependent and independent variables;
- devise plans and procedures to carry out investigations;
- select appropriate apparatus to carry out investigations;
- observe and record experimental observations accurately and honestly;
- analyse data gathered from experiments or other sources;
- draw conclusions and make predictions;
- use appropriate techniques to present findings and to convey concepts;
- evaluate suggested solutions to a problem from different perspectives;
- evaluate the validity and reliability of findings and identify factors affecting their validity and reliability;
- propose plans for further investigations, if appropriate;

- apply knowledge and understanding to solve problems in unfamiliar situations;
- recognise the usefulness and limitations of scientific methods.

(3) Decision making

Students are expected to:

- make decisions based on evidence and arguments;
- support judgements using appropriate scientific principles;
- put forward suitable reasoning to choose between alternatives.

(4) Practical work

Students are expected to:

- select appropriate apparatus and materials for an experiment;
- handle chemicals safely and apparatus in a proper way;
- carry out instructions for experiments and record observations accurately;
- interpret observations and experimental data;
- devise and plan experiments;
- evaluate experimental methods and suggest possible improvements;
- build models to aid comprehension.

(5) Information handling

Students are expected to:

- search, retrieve, reorganise, analyse and interpret scientific information from a variety of sources;
- use information technology to manage and present information;
- be wary of the accuracy and credibility of information from secondary sources;
- distinguish among fact, opinion and value judgement in processing scientific information.

(6) Communication

Students are expected to:

- use symbols, formulae, equations and conventions appropriately;
- interpret scientific information from text and data presented in verbal, diagrammatic, numerical, tabular and graphical forms;
- organise and present ideas and arguments in a clear and logical form;
- communicate scientific ideas and values in a meaningful and creative way.

Learning Strategy

Students should behave as active learners. Students should initiate, organise, make decision on and take responsibility for their own learning. They can follow the learning strategies below in order to become life-long learners.

1. develop pre-lesson habit
2. concentrate during lesson
3. underline key points and drop down notes during lesson
4. prepare well before attending tests and examinations
5. participate actively in relevant learning activities e.g. discussion, practical works, information searching, outdoor visits, etc.
6. form study groups with peers

Subject Characteristics

The emergence of a highly competitive and integrated economy, rapid scientific and technological innovations, and a growing knowledge base will continue to have a profound impact on our lives. In order to meet the challenges posed by these developments, Chemistry, like other science electives, will provide a platform for developing scientific literacy and for building essential scientific knowledge and skills for lifelong learning in science and technology.

Chemistry deals with the composition, structures and properties of matter, the interactions between different types of matter, and the relationship between matter and energy. Through the learning of chemistry, it is possible to acquire relevant conceptual and procedural knowledge. A study of chemistry also helps to develop understanding and appreciation of developments in engineering, medicine and other related scientific and technological fields.

Furthermore, learning about the contributions, issues and problems related to innovations in chemistry will help students develop an understanding of the relationship between science, technology, society and the environment.

The curriculum attempts to make the study of chemistry exciting and relevant. It is suggested that the learning of chemistry be situated in real-life contexts. The adoption of a range of such contexts together with a range of learning and teaching strategies and assessment practices is intended to appeal to students of all abilities and aspirations, and to stimulate interest and motivation for learning. Students are expected to be able to apply their knowledge of chemistry, to appreciate the relationship between chemistry and other disciplines, to be aware of the science-technology-society-environment (STSE) connections within contemporary issues, and to become responsible citizens.

Teaching Staff

Miss Chan Sau Ha & Miss Chan Sum Yee

Useful links

subject	level	topic	website
chem	67	EDB L&T activities	http://resources.edb.gov.hk/~science/chem.htm
chem	67	Online Teaching Resources - EDB	http://cd1.edb.hkedcity.net/cd/science/chemistry/online_resources.html
chem	67	Kelvar	http://www.kgv.edu.hk/science/Kevlar.htm
chem	67	Reaction Mechanism Animation - EMB	http://cd1.emb.hkedcity.net/cd/science/chemistry/s67chem/reaction_mechanism_animation_e.swf
chem	67	hybridization animations sp sp2 sp3	http://www.mhhe.com/physsci/chemistry/essentialchemistry/flash/hybrv18.swf
chem	67	Lattice energy tutorial 2	http://www.wwnorton.com/chemistry/overview/ch9.htm#lattice_structure

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