

# Chemistry Curriculum

## Aims and objectives

### Aims

Chemistry is a central subject of science. It is also closely related to daily life. The broad aims are to help students to

1. acquire some knowledge of the empirical world.
2. acquire an ability to observe accurately and objectively.
3. acquire an ability to solve problem.
4. acquire an ability to think scientifically, independently and to make rational discussion.
5. acquire an ability to communicate , using the language of chemistry.
6. develop an appreciation of chemistry and its application in daily life.
7. promote an awareness of the social, economic, environmental and technological implication of chemistry.

### Objectives:

1. To encourage students to take an active part in class.
2. To encourage students to develop curiosity and a spirit of enterprise.
3. To teach good laboratory practice and skills.
4. To teach students to be aware of the safety of oneself and others in the laboratory and be committed to safe practices in daily life.
5. To teach students to analyze data from experiments or from other sources.
6. To acquire students a readiness in becoming responsible citizens in a changing world.
7. To provide students with some insight into future career prospect in the fields related to Chemistry.

## Curriculum

### Syllabus

<b>S.3</b>	<b>Planet Earth</b> The atmosphere The ocean	<b>The microscopic world</b> Atomic Structure The Periodic Table Ionic Bonding	<b>Metals</b> Reactivity of metals
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<b>S.4</b>	<b>The microscopic world</b> Covalent bond Metallic bonding Structures and properties	<b>Metals</b> Occurrence and extraction of metals Reactivity of metals Reacting masses Corrosion of metals and their protections
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<b>S4</b>	<b>Chemicals Cells and Electrolysis</b> Chemical cells in daily life Simple chemical cells Redox reactions Reactions in chemical cells Electrolysis	<b>Acids and alkalis</b> Acids Alkalis Indicators and pH Strength of acids and alkalis Neutralization and salts Concentration of solution Simple volumetric work involving acids and alkalis Rate of reaction
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<b>S 5:</b>	<b>Products from Important Processes</b> Chlorine and hypochlorite Sulphuric acid and sulphur dioxide Chemical plants	<b>Fossil Fuels and of Carbon Compounds</b> Fossil fuels Homologous series, structural formulae and naming of carbon compounds Alkanes and alkenes Consequences of using fossil fuels Alcohols
	<b>Plastics and detergents</b> Plastics Detergents	<b>Detection and analysis</b> Separation of mixtures Tests for substances

<b>S.6:</b>	<b>Atoms, Molecules and Stoichiometry</b> The atomic structure Relative isotopic, atomic and molecular formulae The mole concept Empirical and molecular formulae Chemical equations and stoichiometry	<b>The Electronic Structure of Atoms and the Periodic Table</b> Atomic emission spectrum Electronic structure, ionization enthalpies, electron shells and sub-shell Atomic orbitals Electronic configuration The Periodic Table and the atomic properties of the elements
	<b>Energetics</b> Energy changes in chemical reactions Standard enthalpy changes Hess's law Spontaneity of changes	<b>Bonding and Structure</b> The nature of forces holding atoms together Metallic bonding Ionic bonding Covalent bonding Bonding intermediate between ionic and covalent Intermolecular forces Structures and properties of materials of substances
	<b>Chemical Kinetics</b> Rates of chemical reaction Factors influencing reaction rate Rate equations and order of reaction Arrhenius equation The interpretation of reaction rates at molecular level Catalysis	<b>Chemical Equilibrium</b> Dynamic equilibrium Ionic equilibrium Redox equilibrium
	<b>Fundamentals of Organic Chemistry</b> Bonding and structure Fundamental groups and homologous series Systematic nomenclature Isomerism Organic acids and organic bases Reaction mechanism	<b>Chemistry of the Organic Compounds</b> Alkanes and radical substitution Alkenes and electrophilic addition Benzene and electrophilic substitution Halogeno-compounds and nucleophilic substitution Carbonyl compounds and nucleophilic substitution

### Teaching periods per six days cycle

Time for each period:		Mon, Tue, Wed & Thurs: 40 minutes/period
		Fri.: 35 minutes/period
S.3	2 periods	5-10 experiments per year.
NSS1	5 periods	10 -15 experiments per year.
NSS2	5 periods	5 SBA assessments + (10 -15) experiments per year.
NSS3	5 periods	3 SBA assessments + (5-10) experiments per year.

### School Based Assessment

#### ASSESSMENT OBJECTIVES

Reference:

[http://www.hkeaa.edu.hk/DocLibrary/HKDSE/Subject\\_Information/chem/2014hkdse-e-chem-rev.pdf](http://www.hkeaa.edu.hk/DocLibrary/HKDSE/Subject_Information/chem/2014hkdse-e-chem-rev.pdf)

The assessment objectives of Chemistry are to evaluate the abilities of students to:

1. recall and show understanding of chemical facts, patterns, principles, terminology and conventions;
2. show an understanding of the use of apparatus and materials in performing experiments;
3. handle materials, manipulate apparatus, carry out experiments safely and make accurate observations;
4. demonstrate an understanding of the method used in chemical investigation;
5. analyse and interpret data from various sources, and draw relevant conclusions;
6. manipulate and translate chemical data and to perform calculations;
7. apply chemical knowledge to explain observations and to solve problems which may involve unfamiliar situations;
8. select and organise scientific information from appropriate sources and to communicate this information in an appropriate and logical manner;
9. understand and evaluate the social, economic, environmental and technological implications of the applications of chemistry; and
10. make decisions based on the examination of evidence and arguments.

## MODE OF ASSESSMENT

The public assessment of Chemistry consists of a public examination component and a school-based assessment component as outlined in the following table:

	Component	Weighting	Duration
<b>Public Examination</b>	<b>Paper 1</b> Compulsory part of the curriculum	60%	2 hours30 minutes
	<b>Paper 2</b> Elective part of the curriculum	20%	1 hour
<b>School-based Assessment (SBA)</b>		20%	-----

## Implementation schedule of SBA

Reference: <http://www.hkeaa.edu.hk/DocLibrary/SBA/HKDSE/SBAhandbook-2014-CHEM-E-1012.pdf>

### *Assessment Requirement for Chemistry*

For each student attempting the HKDSE Chemistry examination for the first time, the minimum numbers of assessments and the weightings in subject required in S5 and S6 for the SBA are summarized in the table below:

	Minimum number of assessments*	Weighting in subject
S5	2	10%
S6	2	10%

- Over the two years of S5 and S6, there should be at least one assessment for Volumetric Analysis (VA), one assessment for Qualitative Analysis (QA) and two assessments for Other Experiments (EXPT).
- Investigative Study (IS) can be done in lieu of Other Experiments (EXPT). In this case, one assessment on 'proposal' and one assessment on 'process and report' should be performed. These two assessments can satisfy the minimum requirement for Other Experiments (EXPT).

### Notes

1. Our school will carry out more than the minimum number of assessments for each student. There would be a total of 8 SBA (**2QA+ 2VA+ 4 EXPT**) marks to be submitted to the HKEAA from S5 to S6.
2. Teachers will submit their assessment marks together with a list of tasks done in S5 and in S6, showing the coverage of the different types of work.
3. These marks contribute to **20%** of the final subject mark of Chemistry in HKDSE.

## Useful Websites

They are most suitable for accessing updated information on current issues.

Address	Name of Homepage
◆ <a href="http://cd1.emb.hkedcity.net/cd/science/chemistry/tas.htm">http://cd1.emb.hkedcity.net/cd/science/chemistry/tas.htm</a>	TAS Resource Corner
◆ <a href="http://cd1.emb.hkedcity.net/cd/science/chemistry/s45_chem/curr2003.htm">http://cd1.emb.hkedcity.net/cd/science/chemistry/s45_chem/curr2003.htm</a>	Science Education Section, Education and Manpower Bureau.
◆ <a href="http://www.chem.cuhk.edu.hk/lab_tec_hnique.asp">http://www.chem.cuhk.edu.hk/lab_tec_hnique.asp</a>	Basic Laboratory Techniques (HKCU)
◆ <a href="http://resources.emb.gov.hk/~science/hkcho.htm">http://resources.emb.gov.hk/~science/hkcho.htm</a>	Hong Kong Chemistry Olympiad for Secondary School
◆ <a href="http://nobelprize.org/nobel_prizes/chemistry/">http://nobelprize.org/nobel_prizes/chemistry/</a>	The Nobel Prize in Chemistry
◆ <a href="http://etvonline.tv/etv/front/subject.jsp?CS_RER_NBR=38&amp;PHPSESSID=78bca2ea7af30741fca3fe90911e1377">http://etvonline.tv/etv/front/subject.jsp?CS_RER_NBR=38&amp;PHPSESSID=78bca2ea7af30741fca3fe90911e1377</a>	<b>ETV online</b>
◆ <a href="http://www.webelements.com">www.webelements.com</a>	WebElements and Periodic table
◆ <a href="http://www.privatehand.com/flash/elements.html">http://www.privatehand.com/flash/elements.html</a>	The Element Song
◆ <a href="http://en.wikipedia.org/wiki">http://en.wikipedia.org/wiki</a>	Wikipedia, the free encyclopedia
◆ <a href="http://www.sohoo.com.cn/Science_Technology/Natural_science/Chemistry/">http://www.sohoo.com.cn/Science_Technology/Natural_science/Chemistry/</a>	化學, 搜狐
◆ <a href="http://www.chemsoc.org/">http://www.chemsoc.org/</a>	Chemsoc, The chemistry Society
◆ <a href="http://resources.edb.gov.hk/~science/websites.htm">http://resources.edb.gov.hk/~science/websites.htm</a>	<b>Many Chemistry Flash Animations</b>
◆ <a href="http://www2.ups.edu/faculty/hanson/chemwebsites/organicwebsites.htm">http://www2.ups.edu/faculty/hanson/chemwebsites/organicwebsites.htm</a>	Selected Organic Chemistry Websites
◆ <a href="http://www.tangkingpo.edu.hk/~library/web/chem.htm">http://www.tangkingpo.edu.hk/~library/web/chem.htm</a>	Many other Interesting Chemistry Related Links
◆ <a href="http://www.chem4kids.com/">http://www.chem4kids.com/</a>	Chem4kids