CHEMISTRY IN ENGLISH MEDIUM @ IMS

Teacher –V.N. Seneviratne (PhD- Cantab)

GCE (A/L) Chemistry-List of Topics

General Chemistry

Unit 01 : Atomic structure
Unit 02 : Structure and bonding
Unit 03 : Chemical Calculations
Unit 04 : Gaseous state of matter
Unit 05 : Energetics

Inorganic Chemistry

Unit 06 :Chemistry of *s*, *p* and *d* block elements

Organic Chemistry

Unit 07 :Basic concepts of organic chemistry
Unit 08 :Hydrocarbons and halo-hydrocarbons
Unit 09 :Oxygen containing organic compounds
Unit 10 :Nitrogen containing organic compounds

Physical Chemistry

Unit 11 :Chemical kinetics
Unit 12 :Equilibrium
- Chemical Equilibria
- Acid Base Equilibria
- Solubility Product
- Homogenous Phase Equilibria
- Heterogenous Phase Equilibria

Unit 13 :Electro chemistry

Industrial Chemistry

Unit 14 :Industrial chemistry and Environmental pollution

Class Schedule

April 2025 to July 2025 : Every Friday from 1.30 pm to 5.00 pm

After results are released : Every Saturday from 1.00 pm to 5.00 pm.

References

Chemistry, 11th Edition by Raymond Chang, Kenneth A. Goldsby

Resouce Books from NIE.

Contact

Vajira Seneviratne : 0777-840259

General Certificate of Education (Advanced Level)

GRADES 12-13

CHEMISTRY SYLLABI

(Implemented from 2017)

Department of Science
National Institute of Education
Maharagama
Sri Lanka
www.nie.lk

List of topics and allocated number of periods

	Topic	Number of Periods
Unit 01	Atomic structure	35
Unit 02	Structure and bonding	35
Unit 03	Chemical calculations	37
Unit 04	Gaseous state of matter	32
Unit 05	Energetics	41
Unit 06	Chemistry of *s,p* and *d* block elements	64
Unit 07	Basic concepts of organic chemistry	17
Unit 08	Hydrocarbons and halohydrocarbons	46
Unit 09	Oxygen containing organic compounds	46
Unit 10	Nitrogen containing organic compounds	14
Unit 11	Chemical kinetics	41
Unit 12	Equilibrium	94
Unit 13	Electro chemistry	33
Unit 14	Industrial chemistry and Environmental pollution	65
	Total =	**600**

3.0 Syllabus - 3.1 - Grade 12

Unit 01: Atomic Structure **Periods 35**

Competency	Competency level	Contents	Outcome	No. of Periods
1.0 Uses electronic arrangements and energy transactions in determining the nature of matter	1.1 Reviews the models of atomic structure	• Properties of cathode rays • Introduction to atom and sub atomic particles • Rutherford model • Atomic number and mass number • Isotopes • Nuclides • Relative atomic mass • *Demonstrating properties of cathode rays*	**Student should be able to-** • writes the observations after observing the demonstration of cathode rays. • discuses the properties of cathode rays. • describes the atom and subatomic particles. • describes the Rutherford's model with the help of the conclusion of gold leaf experiment. • states the atomic number and mass number. (nucleon number) • explains the contribution of protons and neutrons to atomic nuclei to define isotope • states nuclides. • works out simle calculations using the ralative atomic mass of an atom. • appreciates the attempts made by scientists in understanding nature.	06

Competency	Competency level	Contents	Outcomes	No.of Periods
	1.2 Investigates the different types of electromagnetic radiation	• Wave- particle dual nature of matter • Electromagnetic radiation · [speed (c), wavelength (λ), frequency (ν), energy (E)] • $c = \nu\lambda$ • $E = h\ \nu$, $\lambda = \frac{h}{mV}$ • Electromagnetic spectrum	• states de Broglie equation • describes wave-particle duality of the matter with de Broglie equation. $\lambda = \frac{h}{mV}$ • names physical quantities that describe the properties of waves with the relationships among them. • states the electromagnetic radiation. • works out simple problems using $c = \nu\ \lambda$ and $E = h\ \nu'$ $\lambda = \frac{h}{mV}$, $E = mc^2$ • names the different ranges in the electromagnetic spectrum.	04

Competency	Competency level	Contents	Outcomes	No.of Periods

	1.3 States the evidence for electronic energy levels of atoms	• Variation of successive ionization energies of variation of successive ionization energies of elements
		• Introduction to Bohr theory and Bohr model
		• Atomic spectrum of hydrogen
		  • Explanation of hydrogen spectrum using Bohr theory
		• Quantization of energy
		• Existence of electrons in energy levels
		  • Introduction to atomic orbitals s, p, d and f
		• Brief introduction to four quantum numbers
		  • The principal quantum number (n)
		  • The Azimuthal quantum number (l)
		  • The magnetic quantum number (m_l)
		  • The spin quantum number (m_s)
		• Shapes of orbitals (s and p *only*)
			• recalls ionization energy of an element.
			• describes succesive ionization energies.
			• presents evidences for the presence of electrons of atoms in main energy levels and sub energy levels using graphs of successive ionization energies.
			• describes the Bohr model.
			• explains qualitatively the series of lines in the atomic spectrum of hydrogen using the Bohr model.
			• states that energy releases or absorbs by an atom as photons/quanta.
			• describes four quantum numbers.
			• explains the existence of electrons in energy levels using quantum numbers up to fourth energy level.
			• states that the identity of an electron in a certain atom is described by the relevant set of quantum numbers.
			• states the information given by four quantum numbers.
			• illustrates the shapes of s and p orbitals.
				09

Competency	Competency level	Contents	Outcomes	No.of Periods

	1.4 States the ground state electronic configuration of isolated (gaseous) atoms and ions	• The maximum numbers of electrons in sub energy levels
		• Principles and rules relevant to the filling up of electrons
		  • Hund rule
		  • Pauli exclusion principle
		  • Aufbau principle and its deviations in higher atomic numbers
		• Ground state electronic configurations of isolated gaseous atoms of elements of atomic numbers from 1 to 54 and their ions
		• Relatively stable electron configurations of sub energy levels(s^2, p^3, p^6 , d^5 and d^{10} only)
			• states the number of electrons in sub energy levels.
			• states the principles and rules relevant to the filling up of electrons.
			• writes the electronic configuration of isolated gaseous atoms and ions of elements with atomic number from 1 to 54 according to the standard form.
			• states the deviation of Aufbau principle using the accepted electron configuration of Pd in 4d series.
			• gives examples for the existence of stable electronic configurations.
				06

Competency	Competency level	Contents	Outcomes	No.of Periods

	1.5 Analyses the electronic configuration of elements to verify their placement in the periodic table and relates atomic properties to electronic configuration	• Building up of the periodic table
		• Introduction to the long form of the periodic table
		  • s, p, d and f blocks
		• Elements in groups 1- 18
		• Trends shown by s and p block elements across the period and down the group
		  • shielding effect and effective nuclear charge (qualitative discussion only)
		  • Atomic radius;
		  • Covalent radius
		  • van der Waals radius
		  • Metallic radius
		  • Ionization energy/ successive ionization energy
		  • Electron gain energy (quantitatively only)
		  • Electronegativity (Pauling scale only)
		  • Formation of cations and anions
			• builds up the periodic table on the basis of electronic configuration.
			• classifies the elements under s, p and d block in relation to the electronic configuration.
			• identifies elements belonging to groups 1 to 18 and periods 1to 7 relevant to the electronic configuration.
			• describes the shielding effect and effective nuclear charge.
			• describes the atomic radius of an element using covalent radius, van der Waals radius and metallic radius.
			• compares the cationic and anionic radius with their atomic radii.
			• explains the variation of covalent radius of s and p block elements accross the periods and down the groups using a graph.
			• explains the zig zag variation of first ionization energies of elements considering their electronic configuration.
			• states electron gain energy.
			• describes the variation of elecron gain energy accross the period and down the group.
			• describes electro negativity of an element according to the Pauling scale.
				08