The City School

Curriculum Distribution Chart

Class: 10: August 2018 to March 2019

Subject: Chemistry			**CIE Code: 5070**
Class 10			
Month : August and September 2018			
5. Energy from chemicals		Week 1	*(a)* describe the meaning of enthalpy change in terms of exothermic (ΔH negative) and endothermic (ΔH positive) reactions *(b)* *represent energy changes by energy profile diagrams, including reaction enthalpy changes and activation energies (see 6.1(c)) *(c)* describe bond breaking as an endothermic process and bond making as an exothermic process *(d)* *explain overall enthalpy changes in terms of the energy changes associated with the breaking and making of covalent bonds *(e)* describe combustion of fuels as exothermic, e.g. wood, coal, oil, natural gas and hydrogen
		Week 2	*(f)* describe hydrogen, derived from water or hydrocarbons, as a potential fuel for use in future, reacting with oxygen to generate electricity directly in a fuel cell (details of the construction and operation of a fuel cell are **not** required) and discuss the advantages and disadvantages of this *(g)* name natural gas, mainly methane, and petroleum as sources of energy *(h)* describe petroleum as a mixture of hydrocarbons and its separation into useful fractions by fractional distillation *(i)* name the following fractions and state their uses *(i)* petrol (gasoline) as a fuel in cars *(ii)* naphtha as feedstock for the chemical industry *(iii)* paraffin (kerosene) as a fuel for heating and cooking and for aircraft

		Week 3	engines *(iv)* diesel as a fuel for diesel engines *(v)* lubricating oils as lubricants and as a source of polishes and waxes *(vi)* bitumen for making road surfaces *(j)* describe photosynthesis as the reaction between carbon dioxide and water in the presence of chlorophyll, using sunlight (energy) to produce glucose and explain how this can provide a renewable energy source.
3. Formulae, stoichiometry and the mole concept		Week 3 *(Cont…)* Week 4	*g)* calculate the percentage mass of an element in a compound when given appropriate information *(h)* calculate empirical and molecular formulae from relevant data *(i)* *calculate stoichiometric reacting masses and volumes of gases (one mole of gas occupies 24 dm^3at room temperature and pressure); calculations involving the idea of limiting reactants may be set (questions on the gas laws and the calculations of gaseous volumes at different temperatures and pressures will not be set) *(j)* *apply the concept of solution concentration (in mol/dm^3 or g/dm^3) to process the results of volumetric experiments and to solve simple problems (appropriate guidance will be provided where unfamiliar reactions are involved) *(k)* calculate % yield and % purity
1. Experimental Chemistry	**1.3 Identification of ions and gases**	Week 4 *(Cont…)* Week 5	*(a)* describe the use of aqueous sodium hydroxide and aqueous ammonia to identify the following aqueous cations: aluminium, ammonium, calcium, copper(II), iron(II), iron(III) and zinc (formulae of complex ions are **not** required) *(b)* describe tests to identify the following anions: carbonate (by the addition of dilute acid and subsequent use of limewater); chloride (by reaction of an aqueous solution with nitric acid and aqueous silver nitrate); iodide (by reaction of an aqueous solution with nitric acid and aqueous silver nitrate); nitrate (by reduction with aluminium and aqueous sodium hydroxide to ammonia and subsequent use of litmus paper) and sulfate (by reaction of an aqueous solution with nitric acid and aqueous barium nitrate) *(c)* describe tests to identify the following gases: ammonia (using damp red litmus paper); carbon dioxide (using limewater); chlorine (using damp litmus paper); hydrogen (using a burning splint); oxygen (using a glowing splint) and sulfur dioxide (using acidified potassium manganate(VII))

			(d) describe a chemical test for water
6. Chemical reactions	**6.1 Rate of reaction**	Week 6	*(a)* *describe the effect of concentration, pressure, particle size and temperature on the rates of reactions and explain these effects in terms of collisions between reacting particles *(b)* define the term *catalyst* and describe the effect of catalysts (including enzymes) on the rates of reactions *(c)* *explain how pathways with lower activation energies account for the increase in rates of reactions *(d)* state that transition elements and their compounds act as catalysts (see 8.3) in a range of industrial processes and that enzymes are biological catalysts
			(e) suggest a suitable method for investigating the effect of a given variable on the rate of a reaction *(f)* *interpret data obtained from experiments concerned with rate of reaction
	6.3 Reversible reactions	Week 7	*(a)* describe the idea that some chemical reactions can be reversed by changing the reaction conditions *(b)* describe the idea that some reversible reactions can reach dynamic equilibrium and predict the effect of changing the conditions (see 7.3(b) and 7.3(c))
4. Electrolysis		Week 8	*Candidates should be able to:* *(a)* describe electrolysis as the conduction of electricity by an ionic compound (an electrolyte), when molten or dissolved in water, leading to the decomposition of the electrolyte *(b)* describe electrolysis as evidence for the existence of ions which are held in a lattice when solid but which are free to move when molten or in solution *(c)* describe, in terms of the mobility of ions present and the electrode products, the electrolysis of molten lead bromide, using inert electrodes *(d)* predict the likely products of the electrolysis of a molten compound *(e)* apply the idea of selective discharge (linked to the reactivity series for cations, see 9.2) to deduce the electrolysis products of aqueous solutions; describe the electrolysis of concentrated aqueous sodium chloride, aqueous copper(II) sulfate and dilute sulfuric acid using inert electrodes *(f)* predict the likely products of the electrolysis of an aqueous electrolyte, given relevant information

		Week 9	*(g)* construct equations for the reactions occurring at each electrode (anode and cathode) during electrolysis *(h)* describe the electrolysis of purified aluminium oxide dissolved in molten cryolite as the method of extraction of aluminium (see 9.5(a)) *(i)* describe the electrolysis of aqueous copper(II) sulfate with copper electrodes as a means of purifying copper *(j)* describe the electroplating of metals, including copper plating, and recall one use of electroplating *(k)* describe the production of electrical energy from simple cells (i.e. two electrodes in an electrolyte) linked to the reactivity series (see 9.2)
9. Metal	**9.1 Properties of metals**	Week 10	*(a)* describe the general physical properties of metals (as solids having high melting and boiling points; malleable; good conductors of heat and electricity) in terms of their structure *(b)* describe alloys as a mixture of a metal with another element, e.g. brass; stainless steel *(c)* identify representations of metals and alloys from diagrams of structures *(d)* explain why alloys have different physical properties from their constituent elements
	9.2 Reactivity series	Week 11	*(a)* place in order of reactivity: aluminium (see also 9.5(b)) calcium, copper, (hydrogen), iron, lead, magnesium, potassium, silver, sodium and zinc by reference to *(i)* the reactions, if any, of the metals with water, oxygen, steam and dilute hydrochloric acid, *(ii)* the reduction, if any, of their oxides by carbon and/or by hydrogen *(b)* describe the reactivity series as related to the tendency of a metal to form its positive ion, illustrated by its reaction with *(i)* the aqueous ions of the other listed metals *(ii)* the oxides of the other listed metals *(c)* deduce the order of reactivity from a given set of experimental results *(d)* describe the action of heat on the carbonates of the listed metals and relate thermal stability to the reactivity series
			(a) describe the ease of obtaining metals from their ores by relating the elements to their positions in the reactivity series

	9.3 Extraction of metals	Week 12	*(b)* describe metal ores as a finite resource and hence the need to recycle metals *(c)* discuss the social, economic and environmental advantages and disadvantages of recycling metals, e.g. aluminium and copper
	9.5 Aluminium	Week 12 *(Cont…)*	*(a)* outline the manufacture of aluminium from pure aluminium oxide dissolved in cryolite (starting materials and essential conditions, including identity of electrodes should be given together with equations for the electrode reactions but no technical details or diagrams are required) *(b)* explain the apparent lack of reactivity of aluminium *(c)* state the uses of aluminium and relate the uses to the properties of this metal and its alloys, e.g. the manufacture of aircraft; food containers; electrical cables
	9.4 Iron	Week 13 Week 14	*(a)* describe and explain the essential reactions in the extraction of iron using haematite, limestone and coke in the blast furnace *(b)* describe steels as alloys which are a mixture of iron with carbon or other metals and how controlled use of these additives changes the properties of the iron, e.g. high carbon steels are strong but brittle whereas low carbon steels are softer and more easily shaped *(c)* state the uses of mild steel (e.g. car bodies; machinery) and stainless steel (e.g. chemical plant; cutlery; surgical instruments) *(d)* describe the essential conditions for the corrosion (rusting) of iron as the presence of oxygen and water; prevention of rusting can be achieved by placing a barrier around the metal (e.g. painting; greasing; plastic coating; galvanising) *(e)* describe the sacrificial protection of iron by a more reactive metal in terms of the reactivity series where the more reactive metal corrodes preferentially (e.g. underwater pipes have a piece of magnesium attached to them)

Second Term January 2019			
7. The chemistry and uses of acids, bases and salts	**7.3 Properties and uses of ammonia**	Week 1 Week 2	*(a)* describe the use of nitrogen, from air, and hydrogen, from cracking oil, in the manufacture of ammonia *(b)* state that some chemical reactions are reversible (e.g. manufacture of ammonia) *(c)* *describe and explain the essential conditions for the manufacture of ammonia by the Haber process *(d)* describe the use of nitrogenous fertilisers in promoting plant growth and crop yield *(e)* compare nitrogen content of salts used for fertilisers by calculating percentage masses *(f)* describe eutrophication and water pollution problems caused by nitrates leaching from farm land and explain why the high solubility of nitrates increases these problems *(g)* describe the displacement of ammonia from its salts and explain why adding calcium hydroxide to soil can cause the loss of nitrogen from added nitrogenous fertiliser
	7.4 Sulfuric acid	Week 3 Week 4	*(a)* describe the manufacture of sulfuric acid from the raw materials sulfur, air and water in the Contact process *(b)* state the use of sulfur dioxide as a bleach, in the manufacture of wood pulp for paper and as a food preservative (by killing bacteria) *(c)* state the uses of sulfuric acid in the manufacture of detergents and fertilisers, and as a battery acid
6. Chemical reactions	**6.2 Redox**	Week 5	*(a)* define oxidation and reduction (redox) in terms of oxygen/hydrogen gain/loss *(b)* define redox in terms of electron transfer *(c)* identify redox reactions in terms of oxygen/hydrogen, and/or electron, gain/loss
		Week 6	*(d)* describe the use of aqueous potassium iodide in testing for oxidising agents and acidified potassium manganate(VII) in testing for reducing agents from the resulting colour changes
	March (2 Weeks)		**Revision**

Mock / Promotion Examination March 2019

The City School

Topic Wise Syllabus Break up Chemistry 5070

- The learning outcomes in weekly break up have been taken from the CIE syllabus. A topic wise break up of units as mentioned in most Chemistry books (CIE content is different from the one being shown in most text book) is given below to assist you in using the text book to the maximum of students' advantage.

Year	Topics/ Units	
Year/ term	**First Term**	**Second Term**
Year 1	• 2.1 Kinetic particle theory (a - e) • 2.3 structure and properties of materials (a) • 1.1 Experimental design (a, b) • 2.2 Atomic structure (a-g) • 8.1 Periodic trends (a-g) • 8.2 Group properties (a-d) • 8.3 Transition elements (a, b)	• 1.2 Methods of purification (a-f) • 2.4 Ionic bonding (a-e) • 2.5 Covalent bonding (a-d) • 2.6 Metallic bonding (a,b) • 2.3 structure and properties of materials (b,c,d) • Formulae and stoichiometry and the mole concept (a-f) • 7.1 The characteristic properties of acids (a – h) • 7.2 Preparation of salts (a-c)
Year 2	• 5 Energy from chemicals (a – j) • 3 Formula, stoichiometry and the mole concept (g – k) • 1.3 Identification of ions and gases (a – d) • 6.1 Rate of reaction (a – f) • 6.3 Reversible reactions (a, b) • 4 Electrolysis (a- k) • 9.1 Properties of metals (a – d) • 9.2 Reactivity series (a – d) • 9.3 Extraction of metals (a – c) • 9.4 Iron (a – e) • 9.5 Aluminium (a – e)	• 7.3 Properties and uses of ammonia (a - g) • 7.4 Sulfuric acid (a, b, c) • 6.2 Redox (a – d)

Year 3	• 10.1 Air (a – j) • 10.2 Water (a – d) • 11.1 Alkanes (a – e) • 11.2 Alkenes (a –g) • 11.3 Alcohols (a – e) • 11.4 Carboxylic acids (a – g) • 11.5 Macromolecules (a –k)	• Revision • Past papers sessions /practice.