The City School

Curriculum Distribution Chart

Subject:Chemistry 2019-2020

Scheme of work/Term wise syllabus breakup

Class Level: 11

Term 1				
STRAND	UNIT	TOPIC	OBJECTIVE	WEEK
	9-Metals	9.1-Properties of metals	*(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 an alloy 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	1
		9.2-Reactivity Series	*(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	
		9.3- Extraction of metals	(a) describe the ease of obtaining metals from their ores by relating the elements to their positions in the reactivity series (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	2
		9.4-Iron	*(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 and often 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)	
		9.5- Aluminium	*(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	1
	4.-Electrolysis	Electrolysis	*(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	3

			(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 *(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	
	10.-Atmosphere and environment	10.1-Air	(a) describe the volume composition of gases present in dry air as 78% nitrogen, 21% oxygen and the remainder being noble gases (with argon as the main constituent) and carbon dioxide (b) describe the separation of oxygen, nitrogen and the noble gases from liquid air by fractional distillation (c) state the uses of oxygen (e.g. in making steel; oxygen tents in hospitals; in welding) (d) name some common atmospheric pollutants (e.g. carbon monoxide; methane; nitrogen oxides	1

			(NO and NO2); ozone; sulfur dioxide; unburned hydrocarbons) (e) state the sources of these pollutants as (i) carbon monoxide from incomplete combustion of carbon-containing substances (ii) methane from bacterial decay of vegetable matter (iii) nitrogen oxides from lightning activity and internal combustion engines (iv) ozone from photochemical reactions responsible for the formation of photochemical smog (v) sulfur dioxide from volcanoes and combustion of fossil fuels (vi) unburned hydrocarbons from internal combustion engines (f) describe the reactions used in possible solutions to the problems arising from some of the pollutants named in (d) (i) the redox reactions in catalytic converters to remove combustion pollutants (ii) the use of calcium carbonate to reduce the effect of 'acid rain' and in flue gas desulfurisation (g) discuss some of the effects of these pollutants on health and on the environment (i) the poisonous nature of carbon monoxide (ii) the role of nitrogen dioxide and sulfur dioxide in the formation of 'acid rain' and its effects on organisms and buildings (h) discuss the importance of the ozone layer and the problems involved with the depletion of ozone by reaction with chlorine-containing compounds, chlorofluorocarbons (CFCs) (i) describe the carbon cycle in simple terms, to include (i) the processes of combustion, respiration and photosynthesis (ii) how the carbon cycle regulates the amount of carbon dioxide in the atmosphere	

			(j) state that carbon dioxide and methane are greenhouse gases and may contribute to global warming, give the sources of these gases and discuss the possible consequences of an increase in global warming	
		10.2-Water	(a) state that water from natural sources contains a variety of dissolved substances (i) naturally occurring (mineral salts; oxygen; organic matter) (ii) pollutant (metal compounds; sewage; nitrates from fertilisers; phosphates from fertilisers and detergents; harmful microbes) (b) discuss the environmental effects of the dissolved substances named in (a) (i) beneficial, e.g. oxygen and mineral salts for aquatic life (ii) pollutant, e.g. hazards to health; eutrophication (c) outline the purification of the water supply in terms of (i) filtration to remove solids (ii) use of carbon to remove tastes and odours (iii) chlorination to disinfect the water (d) describe how sea water can be converted into drinkable water by desalination	
		11.2-Alkene	*(a) describe the alkenes as a homologous series of unsaturated hydrocarbons with the general formula CnH2n and containing the C=C functional group* *(b) draw the structures of branched and unbranched alkenes, C2 to C4, and name the unbranched alkenes, ethene to butene* *(c) describe the manufacture of alkenes and hydrogen by cracking hydrocarbons and recognise that cracking is essential to match the*	

			demand for fractions containing smaller molecules from the fractional distillation of petroleum (crude oil) *(d) describe the difference between saturated and unsaturated hydrocarbons in terms of their structures and in their reaction with aqueous bromine* *(e) describe the properties of alkenes in terms of combustion, polymerisation and their addition reactions with bromine, steam and hydrogen* *(f) state the meaning of polyunsaturated when applied to food products* *(g) describe the manufacture of margarine by the addition of hydrogen to unsaturated vegetable oils to form a solid product*	
		11.3-Alcohol	*(a)* describe the alcohols as a homologous series containing the –OH functional group *(b)* draw the structures of alcohols, C1 to C4, and name the unbranched alcohols, methanol to butanol *(c)* describe the properties of alcohols in terms of combustion and oxidation to carboxylic acids *(d)* describe the formation of ethanol by the catalysed addition of steam to ethene and by fermentation of glucose *(e)* state some uses of ethanol, e.g. as a solvent; as a renewable fuel; in the production of vinegar	1
		11.4-Carboxylic Acid	*(a)* describe the carboxylic acids as a homologous series containing the –CO_2H functional group *(b)* draw the structures of carboxylic acids, methanoic acid to butanoic acid, and name the unbranched acids, methanoic to butanoic acids	1

			(c) describe the carboxylic acids as weak acids, reacting with carbonates, bases and some metals *(d)* describe the formation of ethanoic acid by the oxidation of ethanol by acidified potassium manganate(VII) and the formation of vinegar by bacterial oxidation *(e)* describe the reaction of carboxylic acids from C1 to C4 with alcohols from C1 to C4 to form esters *(f)* draw the structures of and name the esters formed from carboxylic acids (see 11.4 (b)) and alcohols (see 11.3 (b)) *(g)* state some commercial uses of esters, e.g. perfumes; flavourings; solvents	
	Macromolecules	Polymers	*(a) describe polymers as large molecules made from many small units called monomers, different polymers having different repeat units and/or different linkages* *(b) describe the formation of poly(ethene) as an example of addition polymerisation of ethene as the monomer* *(c) state some uses of poly(ethene) as a typical plastic, e.g. plastic bags; clingfilm* *(d) describe nylon, a polyamide, and Terylene, a polyester, as condensation polymers,* *(e) state some typical uses of synthetic fibres such as nylon and Terylene, e.g. clothing; curtain materials; fishing line; parachutes; sleeping bags* *(f) deduce the partial structure of the polymer product from a given monomer and vice versa* *(g) describe the pollution problems caused by the disposal of non-biodegradable plastics*	2

			(h) identify proteins and complex carbohydrates (polysaccharides, e.g. starch) as natural polymers *(i) describe proteins as polymers possessing the same amide linkages as nylon but formed from different monomers* *(j) describe fats as molecules possessing the same ester linkages as Terylene* *(k) describe the hydrolysis of proteins to amino acids and complex carbohydrates (polysaccharides, e.g. starch) to simple sugars*	
Term 2				
		Revision Past papers		