DOYEN PUBLISHERS

HIGH SCHOOL SCHEMES OF WORK

CHEMISTRY FORM 4

(Term 1, 2 & 3)

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WEEK	LESSON	TOPIC	SUB - TOPIC	OBJECTIVES	LEARNING/TEACHING ACTIVITIES	LEARNING/TEACHING RESOURCES	REFERENCES	REMARKS
1	1-2	Acids, bases and salts	Acid and bases	By the end of the lesson, the learners should be able to (i) Define acids and bases	• Defining acids and bases • Writing relevant chemical equations	• Acids- HCL, HNO_3 and H_2SO_4 • Bases – NaOH, Ca(OH) and KOH	• Comprehensive secondary chemistry students book 4 pages 1-3 • Comprehensive chemistry teachers book 4 pages 1-4 • Secondary chemistry- KLB students book 3 page • Foundation chemistry students' book 4 page 3	
	3	Acids, base and salts	Strengths of acids and bases	By the end of the lesson, the learner should be able to (i) Explain the differences between aqueous solutions of weak and strong acids based on the degree to which these dissociate into ions	• Demonstration on the reactions of HCL (aq) and CH_2COOH (aq) with marble chips • Recording of observations • Discussion on strengths of acid • Writing relevant chemical equation	• 2M HCL • 2m CH_3COOH marble chips • Test tube holder • Forceps • Test tube • Chart showing strengths of acids	• Comprehensive secondary chemistry students book 4 pages4-5 • Comprehensive chemistry teachers book 4 pages 3-4 • Secondary chemistry- KLB students book 3 page 1 • Foundation chemistry students' book 4 page 3	
	4-5	Acids, bases and salts	Strengths of acids and bases	By the end of the lesson, the learner should be able to (i) Explain the difference	• Demonstration of experiment comparing electrical conductivity of dilute acid and bases	• 2M HCL • 2m CH_3COOH • 2m $NH_3(aq)$ • Carbon electrodes • 250 cm^3 beaker	• Comprehensive secondary chemistry students book 4 pages5-6	

				between a gaseous solutions of weak and strong acids and bases based on the degree with which they dissociate into ions	• Recording observations • Discussion on strengths of acids and bases • Write relevant chemical equations	• 1 torch, 2 dry cells, connecting wires, • Measuring cylinders	• Comprehensive chemistry teachers book 4 pages 3-4 • Secondary chemistry-KLB students book 3 page 1 • Foundation chemistry students' book 4 page 3	
2	**1**	Acids, bases and salts	Strength of acids and bases	By the end of the lesson, the learner should be able to (i) Explain the difference between aqueous solutions of weak and strong bases based on degree with which they dissociate into ion	• Discussion on strengths of bases • Writing relevant chemical equation	• NAOH • $NH_3(Aq)$ • $CA(OH)_2$ • KOH • Chart showing strengths of bases	• Comprehensive secondary chemistry students book 4 pages6-6 • Comprehensive chemistry teachers book 4 pages 3-4 • Secondary chemistry-KLB students book 3 page 1 • Foundation chemistry students' book 4 page 3	
	2	Acids, bases and salts	Strengths of acids and bases	By the end of the lesson, the learner should be able to (i) Explain the effect on $H^+(aq)$ and OH^- on indicators	• Carrying out experiments comparing acidity and bacity of acids and bases of different concentrations • Recording observations • Discussion of strength of acid and bases • Writing relevant equations	• HCL, CH_2COOH, NaOH, $NH_3(aq)$ • Universal indicator • PH chart • Test tube racks and test tubes • Droppers • Beakers	• Comprehensive secondary chemistry students book 4 pages7-10 • Comprehensive chemistry teachers book 4 pages 3-4 • Secondary chemistry-KLB students book 3 page 1 • Foundation chemistry students' book 4 page 3	

	3	Acids, bases and salts	Characteristics of amphoteric, oxides and hydroxides	By the end of the lesson, the learner should be able to (i) Write formulae and ionic equations for specified acids base and precipitation reaction	• Demonstration of experiments to investigate amphoteric metal hydroxides • Recording of observations • Discussion on characteristic of amphoteric oxides and hydroxides	• Zinc $PbNo_3$ • $AlCl_3$, $Cacl_2$ • $MgSO_4$ $2mNH_{3(aq)}$ • Test tube rack • Distilled water • Wash bottle • Test tubes • 2 droppers • 2 small beakers	• Comprehensive secondary chemistry students book 4 pages11-12 • Comprehensive chemistry teachers book 4 pages 4-5 • Secondary chemistry-KLB students book 3 page 12 • Foundation chemistry students' book 4 page 9	
	4-5	Acids, bases and salts	Characteristics of amphoteric oxides and hydroxides	By the end of the lesson, the learner should be able to (i) Write formulae and ionic equations for specified acid-base and precipitation reactions	• Demonstration of experiments to investigate which metal oxides are amphoteric • Recording observation • Discussion on characteristic of amphoteric oxides and hydroxides	• MgO, Al_2O_3, Fe_2O_3,PbO, CuO, 2m HNO_3, 2m HNO_3, 2m NaoH, 2m $NH_3(aq)$ • Test tubes • Test tube racks • Small beakers • Heat source	• Comprehensive secondary chemistry students book 4 pages12-14 • Comprehensive chemistry teachers book 4 pages 4-5 • Secondary chemistry-KLB students book 3 page 12 • Foundation chemistry students' book 4 page 9	
3	**1**	Acids, bases and salts	Effects of solvent	By the end of the lesson, the learner should be able to (i) Explain the effect of solvent in acid-base characters	• Demonstration of experiment to investigate the reaction of dry and aqueous hydrogen chloride gas with magnesium, litmus paper and marble chips • Recording observations • Writing of relevant chemical equations	• Magnesium ribbon • Marble chips • Distilled water • Dry blue litmus paper • 3 dry gas jar forceps, wash bottles	• Comprehensive secondary chemistry students book 4 pages14-15 • Comprehensive chemistry teachers book 4 pages 5-6 • Secondary chemistry-KLB students book 3 page 9	

							• Foundation chemistry students' book 4 page 13	
	2	Acids, bases and salts	Effects of solvent	By the end of the lesson, the learner should be able to (i) Explain the effect of solvents in acid-base character	• Demonstration of experiments to investigate properties of methylbenzene • Recording observations • Discussions of effects of solvents • Writing of relevant chemical equations	• Magnesium ribbon • Marble chips • Blue and red litmus papers • Solution of HCL (aq) in methylbenzene • Four 100cm^3 beakers • forceps	• Comprehensive secondary chemistry students book 4 pages15-16 • Comprehensive chemistry teachers book 4 pages 5-6 • Secondary chemistry-KLB students book 3 page 9 • Foundation chemistry students' book 4 page 13	
	3	Acid, bases and salts	salts	By the end of the lesson, the learner should be able to (i) Define salts (ii) Test for the presence of specified cations and anions	• Defining salts • Discussion on salts as ionic compounds • Writing of relevant chemical equations	• NAcl, $Mgcl_2$, $CaCo_3$ & $CaSO_4$ solution containing cations • Test tubes, test tube racks, holders, distilled water	• Comprehensive secondary chemistry students book 4 pages16-17 • Comprehensive chemistry teachers book 4 pages 6-7 • Secondary chemistry-KLB students book 3 page 14 • Foundation chemistry students' book 4 page 14	
	4-5	Acids, bases and salts	Precipitation reaction	By the end of the lesson, the learner should be able to (i) Identify precipitates and complex ions produced by specified	• Demonstration of experiments on precipitation reaction involving acids • Recording observations • Discussions • Writing relevant chemical equations	• $H_2SO_{4\,(aq)}$ • Ag, NO_3(aq), $Ba(NO_3)$ • Test tube • Test tube rack • Spatula • 100cm^3 beakers	• Comprehensive secondary chemistry students book 4 pages17-18 • Comprehensive chemistry teachers book 4 pages 12-13	

				cations-anion reactions			• Secondary chemistry-KLB students book 3 page 14 • Foundation chemistry students' book 4 page 14	
4	**1**	Acids, bases and salts	Precipitation reactions	By the end of the lesson, the learner should be able to (i) Identify precipitation and complex ions produced by specified cation-anion reactions	• Demonstration of experiments on precipitation reactions involving salts • Recording observations • Writing relevant chemical equations	• Pb $(NO_3)_2$, Na_2SO_4, $BaCl_2$ • Test tubes • Test tube rack • spatula	• Comprehensive secondary chemistry students book 4 pages 18 • Comprehensive chemistry teachers book 4 pages 7-8 • Secondary chemistry-KLB students book 3 page 14 • Foundation chemistry students' book 4 page 14	
	2	Acids, bases and salts	Reactions of cation in aqueous solutions	By the end of the lesson, the learner should be able to (i) Identify precipitates and complex ions produced by cation-anion reactions	• Carrying out experiments to show the reaction of actions with aqueous sodium hydroxide • Recording observations • Diffusion based on observations • Writing relevant chemical equation	• Aqueous solutions containing Ca^{2+}, Mg^{2+}, Pb^{2+},Fe^{2+}, Fe^{3+}, Ba^{2+}, $2n^{2+}$, Al^{3+} and Cu^{2+}, ions • Test tubes and test tube racks, • Spatula • Beaker • 2m NaOH	• Comprehensive secondary chemistry students book 4 pages 19 • Comprehensive chemistry teachers book 4 pages 7-8 • Secondary chemistry-KLB students book 3 page 18-19 • Foundation chemistry students' book 4 page 17	
	3	Acids, bases and salts	reactions of cations in aqueous solutions	By the end of the lessons, the learner should be able to (i) Identify precipitates	• Carrying out experiments to show the reaction of cations with aqueous ammonia	• Aqueous solutions containing Ca^{2+},$Mg^{2+}Fe^{2+}$, Fe^{3+}, Ba^{2+},Zn^{2+}, Al^{3+}, Cu^{2+} ions	• Comprehensive secondary chemistry students book 4 pages 20	

				and complex ions produced by cation-anion reactions	• Recording observations • Discussion based on observation • Writing relevant chemical equations	• 2m NH_3(aq) • Test tubes • Small beakers • Spatula • Dropper	• Comprehensive chemistry teachers book 4 pages 7-8 • Secondary chemistry-KLB students book 3 page 18-19 • Foundation chemistry students' book 4 page 17	
	4-5	Acids, bases and salts	Reaction of cation in aqueous solutions	By the end of the lesson, the learner should be able to (i) Identify precipitates and complex ions produced by cation-anion reactions	• Carrying out experiments to show reactions of actions	• Aqueous solutions containing Ca^{2+},$Mg^{2+}Fe^{2+}$, Fe^{3+}, Ba^{2+},$Zn^{2+,}$ Al^{3+}, Cu^{2+} ions • Na_2CO_3 (aq) • HCL(aq), H_2SO_4 • Test tubes • beakers	• Comprehensive secondary chemistry students book 4 pages 21-22 • Comprehensive chemistry teachers book 4 pages 7-8 • Secondary chemistry-KLB students book 3 page 18-19 • Foundation chemistry students' book 4 page 17	
5	**1**	Acids, bases and salts	Solubility, solubility curves	By the end of the lesson, the learner should be able to (i) Explain the use of solubilites curves in salt extraction	• Carrying out experiments to show the relationship between solubility of various salts and temperatures • Recording observations • Drawing solubility curves	• NaCl, $KcLO_3$, KNO^3, $CaSO_4$, distilled water • Measuring cylinder • 100 cm^3 beakers • Glass rod, • Thermometer • Test tube • Source of heat	• Comprehensive secondary chemistry students book 4 pages 24-26 • Comprehensive chemistry teachers book 4 pages 9 • Secondary chemistry-KLB students book 3 page 20-23 • Foundation chemistry students' book 4 page 20	
	2	Acids, bases and salts	Extraction of salts				• Comprehensive secondary chemistry	

				By the end of the lesson, the learner should be able to (i) State various methods of salt extraction	• Discussion on various methods of extraction of salts	• Chart on the process of extraction • Photographs from brochure of salt extraction plants	students book 4 pages 26-29 • Comprehensive chemistry teachers book 4 pages 10 • Secondary chemistry-KLB students book 3 page 24 • Foundation chemistry students' book 4 page	
	3	Acid, bases and salts	Water harchess	By the end of the lesson, the learner should be able to (i) State the types of causes of hardness of water	• Demonstration of experiments to investigate hardness of water • Recording observations • Discussion based on observations • Writing relevant chemical reaction equation	• 2Ml, $CaCl_2$, $Ca(HCO_3)_2$, $CaSO_4$, $MgSO_3$ • Bar soap • Distilled water • Tap water • Sea water • Test tubes • Dropper • Beaker • spatula	• Comprehensive secondary chemistry students book 4 pages 30-31 • Comprehensive chemistry teachers book 4 pages 10 • Secondary chemistry-KLB students book 3 page 25-26 • Foundation chemistry students' book 4 page 24	
	4-5	Acids, bases and salts	Water hardness	By the end of the lesson, the learner should be able to (i) State the effects of boiling on hardness of water (ii) Explain the methods of removal of water hardness	• Carrying out experiments to show the effects of boiling on hardness of water • Recoding observation and other methods of removing hardness of water • Writing relevant chemical equation	. Solution of $Ca(HCO_3)_2$. $Mg(HCO_3)_2$, $CaSO_4$, $MGSO_4$,$Ca(OH)_2NH_3(aq)$. Distilled water . Tap water . Sea water . Soap solution . Beaker's . Test tubes & droppers	• Comprehensive secondary chemistry students book 4 pages 31-35 • Comprehensive chemistry teachers book 4 pages 10 • Secondary chemistry-KLB students book 3 page 25-26 • Foundation chemistry students' book 4 page 24	

6	**1**	Energy changes in reactions	Introduction exothermic reactions	By the end of the lesson, the learner should be able to (i) Define endothermic reactions using H rotation	• Demonstration of experiments to investigate exothermic reactions • Recording observations • Discussion based on observations	• KNO_3, NaCL • Dilute water • Spatula • Test tubes • Test tube rack • Concentrated H_2SO_4 • Distilled water • Test tubes • Test tube rack	• Comprehensive secondary chemistry students book 4 pages 41-43 • Comprehensive chemistry teachers book 4 pages 23-24 • Secondary chemistry-KLB students book 3 page 32-35 • Foundation chemistry students' book 4 page 40	
	2	Energy changes in reactions	Endothermic reactions	By the end of the lesson, the learner should be able to (i) Define endothermic reactions using H rotation	• Carrying out experiments to investigate endothermic reactions • Recording observations • Discussion based on observations	• KNO_3, Nacl • Distilled water • Spatula • Test tube • Test tube rack	• Comprehensive secondary chemistry students book 4 pages 44-45 • Comprehensive chemistry teachers book 4 pages 23-24 • Secondary chemistry-KLB students book 3 page 32-35 • Foundation chemistry students' book 4 page 40	
	3	Energy changes in reactions	Energy level diagrams	By the end of the lesson, the learner should be able to (i) Draw energy level diagrams for exothermic reactions	• Discussions energy level diagram • Drawing the energy level diagrams	• Graph papers pencil, rules • Charts on energy level diagram for exothermic reactions	• Comprehensive secondary chemistry students book 4 pages 44 • Comprehensive chemistry teachers book 4 pages 23,30 • Secondary chemistry-KLB students book 3 page 33-34	

							• Foundation chemistry students' book 4 page 41	
	4-5	Energy changes in reactions	Energy level diagrams	By the end of the lesson, the learner should be able to (i) Draw energy level diagrams for endothermic reactions	• Discussion on energy level diagrams for endothermic reactions • Drawing the energy level diagrams for endothermic reactions	• Graph, papers, pencils, rulers • Charts on energy level diagrams for endothermic reactions	• Comprehensive secondary chemistry students book 4 pages 45 • Comprehensive chemistry teachers book 4 pages 23,30 • Secondary chemistry-KLB students book 3 page 33-34 • Foundation chemistry students' book 4 page 41	
7	**1-2**	Energy changes in reactions	Latent-heat	By the end of the lesson, the learner should be able to (i) Explain fusion and vaporization as evidence of inter-particle forces	• Demonstration of experiments to investigate latent heat of fusion and vaporization • Recording observations • Discussion on latent-heat of vaporization	• Ice • Beakers • Graph paper • Source of heat • Thermometers • Distilled water	• Comprehensive secondary chemistry students book 4 pages 45-46 • Comprehensive chemistry teachers book 4 pages 25 • Secondary chemistry-KLB students book 3 page 37 • Foundation chemistry students' book 4 page 42	
	3	Energy changes in reactions	Comparison between heat and fusion and heat of vaporization	By the end of the lesson, the learner should be able to (i) Explain that energy changes in chemical reactions are due to bond	• Discussion in heat of fusion and heat of vaporization	• Chart showing comparison between latent heat of fusion and of vaporization	• Comprehensive secondary chemistry students book 4 pages 46 • Comprehensive chemistry teachers book 4 pages 25	

				formation and bond breakage			• Secondary chemistry-KLB students book 3 page 37-38 • Foundation chemistry students' book 4 page 44	
	4-5	Energy changes in reaction	Enthalpy	By the end of the lesson, the learner should be able to (i) Define and explain the various types of heat changes	• Discussion on enthalpy • Drawing of energy level diagrams	• Chart on energy level diagram	• Comprehensive secondary chemistry students book 4 pages 47-50 • Comprehensive chemistry teachers book 4 pages 25-27 • Secondary chemistry-KLB students book 3 page 40 • Foundation chemistry students' book 4 page 41	
8	**1-2**	Energy changes in reaction	Quantitative determination of enthalpies	By the end of the lesson, the learner should be able to (i) Carry out experiments to determine enthalpy change of reactions	• Demonstration on experiment to investigate enthalpy change of ammonium nitrate solution • Recording of observations • Calculating enthalpy of solutions • Drawing the one lever diagram	• Distilled water • NH_4NO_3 • Thermometer (-10^0c-110^0c) • Fixed cork • 250 cm^3 plastic bottle • $100cm^3$ • Measuring cylinder • Weighing balance	• Comprehensive secondary chemistry students book 4 pages 50-51 • Comprehensive chemistry teachers book 4 pages 25-28 • Secondary chemistry-KLB students book 3 page 40 • Foundation chemistry students' book 4 page 45	
	3	Energy changes in reaction	Quantitative determination of enthalpies	By the end of the lesson, the learner should be able to (i) Carry out experiments	• Carrying out experiments to show enthalpy change of sodium hydroxide solution	• NAOH • Distilled water • Thermometer • -10^0c-110^0C • Plastic bottle	• Comprehensive secondary chemistry students book 4 pages 50-51	

				to determine enthalpy changes in reactions	• Recording observations • Calculating enthalpy of solutions • Drawing the energy level diagram	• $50cm^3$ measuring cylinder • Weighing balance	• Comprehensive chemistry teachers book 4 pages 25-28 • Secondary chemistry-KLB students book 3 page 40 • Foundation chemistry students' book 4 page 45	
	4-5	Energy changes in reaction	Quantitative determination of enthalpies	By the end of the lesson, the learner should be able to (i) Carry out experiments to determine enthalpy change of reactions	• Carrying out experiments to investigate enthalpy change of the dissolution of concentrated H_2SO_4 • Recording observations calculating enthalpy change involved • drawing of energy level diagram	• concentrated sulphuric acid • distilled water $250cm^3$ • plastic bottle • test tube • $5cm^3$ and 50 cm^3 • Measuring cylinders • Thermometer (-10^0c-110^0c)	• Comprehensive secondary chemistry students book 4 pages 50-51 • Comprehensive chemistry teachers book 4 pages 25-28 • Secondary chemistry-KLB students book 3 page 40 • Foundation chemistry students' book 4 page 45	
9	**1-2**	Energy changes in reaction	Quantitative determination of enthalpies	By the end of the lesson, the learner should be able to (i) Determine enthalpies of combustion of methanol	• Demonstration of experiments to investigate combustion of methanol • Recording observations • Calculating enthalpies of combustion • Drawing of energy level diagram	• Methanol • Distilled water • Methanol burner with a lid • Thermometer • Calorimeter • Burette • Standard clamp	• Comprehensive secondary chemistry students book 4 pages 53-55 • Comprehensive chemistry teachers book 4 pages 27-28 • Secondary chemistry-KLB students book 3 page 40 • Foundation chemistry students' book 4 page 45	

	3	Energy changes in reactions	Quantitative determination of enthalpies	By the end of the lesson, the learner should be able to (i) Determine the enthalpy of displacement in the reaction between zinc metal and copper (II) sulphate solution	• Carrying out experiments to show displacement of CU^{2+} by Zinc metal • Calculating enthalpy of displacement of energy level diagrams	• Zinc powder 0.2m Copper (II) sulphate solution • $100cm^3$ plastic beaker • Thermometer • Plastic beaker • Measuring cylinder • Weighing balance	• Comprehensive secondary chemistry students book 4 pages 56-58 • Comprehensive chemistry teachers book 4 pages 28 • Secondary chemistry-KLB students book 3 page 40 • Foundation chemistry students' book 4 page 45	
	4-5	Energy changes in reaction	Thermo chemical equations	By the end of the lesson, the learner should be able to (i) Write correct simple thermo chemical equations	• Discussions on simple thermo chemical equations • Writing thermo chemical equations	• Charts showing simple thermo chemical equations	• Comprehensive secondary chemistry students book 4 pages 62-63 • Comprehensive chemistry teachers book 4 pages 30 • Secondary chemistry-KLB students book 3 page 41-42 • Foundation chemistry students' book 4 page 45	
10	**1**	Energy changes in reaction	Enthalpy of neutralization	By the end of the lesson, the learner should be able to (i) Determine the enthalpy of neutralization of sodium hydroxide and ethanoic acid	• Carrying out experiments to investigate neutralizations • Recording observations • Drawing graphs • Calculating heat of neutralization	• Thermometer • Test tubes • Test tube rack • NaOH, HCL	• Comprehensive secondary chemistry students book 4 pages 59-62 • Comprehensive chemistry teachers book 4 pages 29-30 • Secondary chemistry-KLB students book 3 page 51	

							• Foundation chemistry students' book 4 page 45	
	2-3	Energy changes in reactions	Hess' law and related calculations Relationship between heat solution, hydration and latine energy	By the end of the lesson, the learner should be able to (i) State Hess' law and carry out related calculations	• Discussion on Hess' law • Drawing of energy level diagrams • Calculation sums on Hess' law • Discussion on relationship between heat of solutions, hydration and lattice energy	• Chart showing energy and diagram • Graph papers	• Comprehensive secondary chemistry students book 4 pages 64-69 • Comprehensive chemistry teachers book 4 pages 30-31 • Secondary chemistry-KLB students book 3 page 56-64 • Foundation chemistry students' book 4 page 73	
	4-5	Energy changes in reaction	Common fields	By the end of the lesson, the learner should be able to (i) State and explain the factors that influence the choice of fuels (ii) Explain the effects of fuels on the environment	• Listing examples of common fuels • Stating disadvantages and advantages of common fuels • Explaining effects of fuels on the environment	• Chart showing diagrams of common fuels • Pictures of common fuels • Chart showing heat values for common fuels	• Comprehensive secondary chemistry students book 4 pages 70-74 • Comprehensive chemistry teachers book 4 pages 31-32 • Secondary chemistry-KLB students book 3 page 64 • Foundation chemistry students' book 4 page 88	
11	**1**	Reaction rules and reversible reactions	Introduction reaction rates	By the end of the lesson, the learner should be able to (i) Define rate of reaction	• Defining rate of reaction • Discussion on rates of reaction • Listing factors that affect the rates of reaction	• Chart on factors that affect rates of reaction	• Comprehensive secondary chemistry students book 4 pages 79 • Comprehensive chemistry teachers book 4 pages 44-45	

							• Secondary chemistry- KLB students book 3 page 73 • Foundation chemistry students' book 4 page 104	
	2	Reaction rates and reversible reactions	Attraction energy	By the end of the lesson, the learner should be able to (i) Explain the term actuation energy	• Discussion on actuation energy • Drawing energy law diagrams	• Chart showing energy level diagrams	• Comprehensive secondary chemistry students book 4 pages 79-80 • Comprehensive chemistry teachers book 4 pages 44-46 • Secondary chemistry- KLB students book 3 page 91 • Foundation chemistry students' book 4 page 109	
	3	Reaction rates and reversible reactions	Methods used to measure rate of reaction	By the end of the lesson,the learner should be able to (i) Describe methods used to measure rates of reaction	• Discussion on methods used to measure rate of reaction • Listing of methods used	• Chart on methods used in measuring rates of reaction • Black board	• Comprehensive secondary chemistry students book 4 pages 81 • Comprehensive chemistry teachers book 4 pages 46 • Secondary chemistry- KLB students book 3 page 73-74 • Foundation chemistry students' book 4 page 110	
	4-5	Reaction rates and reversible reactions	Factors that affect the rate of reactions	By the end of the lesson, the learner should be able to (i) Explain the effect of	• Carrying out experiments to investigate the effects of concentration on the rate of reaction	• 0.05 sodium thiosulphate • 1m hydrochloric acid • Distilled water	• Comprehensive secondary chemistry students book 4 pages 81-83	

				concentration of reactions on the rate of reaction	• Recording observation • Discussion based on observations • Drawing curves • Calculating the rate of reaction	• White paper • Black/blue pen • Six 100ccm3 beakers • 10 $cm^3$and 30cm^3 measuring cylinders • Stop watch/clock	• Comprehensive chemistry teachers book 4 pages 46 • Secondary chemistry-KLB students book 3 page 73-82 • Foundation chemistry students' book 4 page 111	
12	**1-2**	Reaction rates and reversible reactions	Factors that affect the rate of reaction	By the end of the lesson, the learner should be able to (i) Explain the effect of pressure and surface area on the rate of reactions	• Carrying out experiments to investigate the effects of pressure and surface area on the rate of reaction • Recording observations • Discussions on observations • Drawing graphs	• Marble chips • M HCL • Mortar and pestle • Weighing balance • Two 250cm^3conical flasks	• Comprehensive secondary chemistry students book 4 pages 84-85 • Comprehensive chemistry teachers book 4 pages 46-47 • Secondary chemistry-KLB students book 3 page 78-84 • Foundation chemistry students' book 4 page 111	
	3	Reaction rates and reversible reactions	Factors that affect the rate of reaction	By the end of the lesson, the learner should be able to (i) Explain the effects of temperature on the rate of reaction	• Carrying out experiments to investigate the effect of temperature on the rate of reaction • Recording observations • Discussion based on observations • Drawing of graphs	• 1M hydrochloric acid • Distilled water • 0.05 M • Sodium thiosulphate • Conical flasks • Measuring cylinders • Stop watch • Thermometer • White paper • labels	• Comprehensive secondary chemistry students book 4 pages 85-86 • Comprehensive chemistry teachers book 4 pages 47 • Secondary chemistry-KLB students book 4 page 73-84 • Foundation chemistry students' book 4 page 111	

	4-5	Reaction rates and reversible reactions	Factors that affect the rate of reaction	By the end of the lesson, the learner should be able to (i) Explain the effect of catalysts and light on the rate of reaction	• Carrying out experiments to investigate the effect of catalyst and light on the rate of reaction • Recording observations • Discussion based on observations • Drawing of graphs	• 2 volumes hydrogen peroxide • Manganese (IV) oxide • Conical flask • Burettes • Stop watch • Wash bottle • Measuring cylinders	• Comprehensive secondary chemistry students book 4 pages 86-89 • Comprehensive chemistry teachers book 4 pages 48-49 • Secondary chemistry-KLB students book 3 page • Foundation chemistry students' book 4 page 111	
13	**1-2**	Reaction rates	Equilibrium	By the end of the lesson, the learner should be able to (i) Explain chemical equilibrium as a state of balance	• Discussion on reversible reactions • Drawing of graph of forward and backward reaction • Representing reversible reactions in the for of	• Charts on graphs of forward and backward reactions • Copper (ii) sulphate • Stand and clamp • Spatula • Bunsen burner	• Comprehensive secondary chemistry students book 4 pages 91-93 • Comprehensive chemistry teachers book 4 pages 49 • Secondary chemistry-KLB students book 3 page 91 • Foundation chemistry students' book 4 page 164	
	2	Reaction rates and revisable reactions	Equilibrium	By the end of the lesson, the learner should be able to (i) Explain chemical equilibrium as a state of balance	• Carrying out experiments to investigate acid-alkali equilibrium and chromate dichromate equilibrium • Recording observations • Discussions based on observations	• 1M sodium hydroxide • 1 M hydrochloric acid • 0.2 M potassium chromate (VI) solution • 250 cm^3 beaker • Measuring cylinder • 2 droppers	• Comprehensive secondary chemistry students book 4 pages 93-95 • Comprehensive chemistry teachers book 4 pages 49-50 • Secondary chemistry-KLB students book 3 page 94	

						• Phenolphthalein indicator	• Foundation chemistry students' book 4 page 153	
	5	Reaction rates and reversible reactions	Factors that affect equilibrium	By the end of the lesson, the learner should be able to (i) Explain the factors that affect the position of equilibrium	• Demonstration of experiments to investigate effects of pressure and temperature on equilibrium • Recording observations • Discussion based on observations	• Nitrogen (iV) oxide • Ice cold water • 3 test tubes • Bunsen burner • Tripod stand • Wire gauze • Beaker	• Comprehensive secondary chemistry students book 4 pages 95-97 • Comprehensive chemistry teachers book 4 pages 50-51 • Secondary chemistry-KLB students book 3 page 95 • Foundation chemistry students' book 4 page 155	

CHEMISTRY FORM 4 SCHEMES OF WORK – TERM 2

WEEK	LESSON	TOPIC	SUB - TOPIC	OBJECTIVES	LEARNING/TEACHING ACTIVITIES	LEARNING/TEACHING RESOURCES	REFERENCES	
1	1-2	Election chemistry	Introduction Redox reactions	By the end of the lesson, the learner should be able to (i) Explain redox reactions in terms of gain and less of electrons	• Carry out experiments on redox reactions • Recording observations • Discussions based on observations • Writing redox equations	• 20 volume hydrogen peroxide • Iron (II) sulphate crystals • Distilled water • 2M sulphate acid • Measuring beakers • Spatula • Glass rod	• Comprehensive secondary chemistry students book 4 pages 104-105 • Comprehensive chemistry teachers book 4 pages 64-65 • Secondary chemistry-KLB students book 3 page 108 • Foundation chemistry students' book 4 page 172	
	3	Electro-chemistry	Redox reactions (oxidation numbers)	By the end of the reaction the should be able to (i) Identify changes in oxidation number during redox reactions	• Discussions on oxidation numbers • Listing rules used when assigning oxidation numbers • Writing redox equations	• Chart on oxidation numbers of different elements	• Comprehensive secondary chemistry students book 4 pages 104-105 • Comprehensive chemistry teachers book 4 pages 64-65 • Secondary chemistry-KLB students book 3 page 108 • Foundation chemistry students' book 4 page 172	

	4-5	Electro-chemistry	Redox reactions (oxidation numbers)	By the end of the lesson, the learner should be able to (i) Identify changes in oxidation numbers during redox reactions	• Calculating the oxidation numbers of different elements • Writing redox reactions	• Table showing oxidation numbers of elements	• Comprehensive secondary chemistry students book 4 pages 107-108 • Comprehensive chemistry teachers book 4 pages 65 • Secondary chemistry-KLB students book 3 page 108 • Foundation chemistry students' book 4 page 172	
2	**1-2**	Electro-chemistry	Redox reaction	By the end of the lesson, the learner should be able to (i) Write balanced redox reactions	• Carry out experiments on redox reactions • Recording observations • Discussion based on observations • Writing and balancing redox reactions	• Potassium manganate (VII) sodium • Iron (II) sulphate • 2M Sulphiric acid • 2M sodium hydroxide • Potassium dichromate (VI) solution • Measuring cylinder • droppers	• Comprehensive secondary chemistry students book 4 pages 108-109 • Comprehensive chemistry teachers book 4 pages 65 • Secondary chemistry-KLB students book 3 page 108 • Foundation chemistry students' book 4 page 172	
	3-4	Electro-chemistry	Displacement reactions	By the end of the lesson, the learner should be able to (i) Compare the oxidating and reduction powers of ions from displacement reactions	• Carry out experiments to investigate reactions involving metals • Recording observations • Discussions based on observations • Identifying the reducing and oxidizing reagents	• 1M Copper (II) sulphate solution • Zinc powder • Copper powder • Iron powder • 1M zinc sulphate solutions • $50cm^3$ beaker • Measuring cylinder	• Comprehensive secondary chemistry students book 4 pages 110-112 • Comprehensive chemistry teachers book 4 pages 65-66 • Secondary chemistry-KLB students book 3 page 116	

						• Spatula • Glass rod	• Foundation chemistry students' book 4 page 184	
	5	Electro-chemistry	Electrochemical cells	By the end of the lesson, the learner should be able to (i) Explain an electrochemical cell in terms of election transfer process	• Carrying out experiments to investigate an electrochemical cell in terms of transfer process • Discussion on electrochemical cells • Drawing of electrochemical cell	• Chart on electrochemical cells • Two beakers voltmeter • Electrodes • Connecting wire • Ammeter • KNO_3	• Comprehensive secondary chemistry students book 4 pages 113-114 • Comprehensive chemistry teachers book 4 pages 67 • Secondary chemistry-KLB students book 3 page 123 • Foundation chemistry students' book 4 page 194	
3	**1-2**	Electro-chemistry	Electrochemical cells	By the end of the lesson, the learner should be able to (i) Explain electrochemical cells in terms of electron transfer process	• Carry out experiments to investigate electron transfer reactions • Recording observations • Discussion based on observations • Writing redox reactions involved	• 1M copper (II) sulphate solution • 1M potassium nitrate solution • Copper and zinc straps • Ammeter • Voltmeter • Beakers • switchers	• Comprehensive secondary chemistry students book 4 pages 114-116 • Comprehensive chemistry teachers book 4 pages 67 • Secondary chemistry-KLB students book 3 page 123 • Foundation chemistry students' book 4 page 194	
	3-4	Electro-chemistry	Cell diagrams and notation	By the end of the lesson, the learner should be able to (i) Draw cell diagrams and white cell notation	• Carry out experiments to measure e.m.f of an electrochemical • Recording observations • Discussion based on observation • Drawing the cell diagrams	• Copper strip • Zinc strip lead strip • Magnesium ribbon • 1M zinc sulphate solution • 1M lead (II) nitrate	• Comprehensive secondary chemistry students book 4 pages 116-119 • Comprehensive chemistry teachers book 4 pages 67	

					• Writing cell notation	• Switch • voltmeter	• Secondary chemistry-KLB students book 3 page 127-129 • Foundation chemistry students' book 4 page 202	
	5	Electro-chemistry	Construction and working of electrochemical cells	By the end of the lesson, the learner should be able to (i) Explain the construction and working of an electro chemical cell such as Zinc-copper cell	• Demonstration of experiment of construct and work an electrochemical cell • Recording observations • Discussions based on observations • Writing cell notation	• Copper strip • Zinc strip • 1M copper sulphate solution • 1 M zinc sulphate solution • 1M potassium nitrate • Two 250 cm^3 beakers • Switches • voltmeters	• Comprehensive secondary chemistry students book 4 pages 116-118 • Comprehensive chemistry teachers book 4 pages 67 • Secondary chemistry-KLB students book 3 page 123 • Foundation chemistry students' book 4 page 194	
4	**1-2**	Electro-chemistry	Working and electrochemical cells	By the end of the lesson, the learner should be able to (i) Explain the working of electrochemical cells	• Drawings of Zinc-Copper cell • Identifying the anode and cathode • Discussion on the working of electro-chemical cells	• Zinc strip • Copper strip • Sulphate solution • 1M zinc Sulphate solution • 1M potassium nitrate • Connecting wires • Bulb holders	• Comprehensive secondary chemistry students book 4 pages 116 • Comprehensive chemistry teachers book 4 pages 67 • Secondary chemistry-KLB students book 3 page 123 • Foundation chemistry students' book 4 page 194	
	3	Electro-chemistry	Electromotive force of a cell (e.m.f)	By the end of the lesson, the learner should be able to (i) Calculate the electromotive	• Discussion based on the electromotive cell • Calculating the e.m.f of the cell	• Chart on electrochemical cell • An electrochemical cell	• Comprehensive secondary chemistry students book 4 pages 114-225	

				force (e.m.f) of a cell, given the electrode potentials			• Comprehensive chemistry teachers book 4 pages 67 • Secondary chemistry-KLB students book 3 page • Foundation chemistry students' book 4 page 203	
	4-5	Electro-chemistry	Standard electrode potential	By the end of the lesson, the learner should be able to (i) Calculate the electrometer force (e.m.f) of a cell given the standard electrode potentials	• Carrying out experiments to measure electrode potentials • Recording observations • Discussion based in observations • Calculation of e.m.f of a cell	• Zinc strip • Copper strip • 1M copper (II) sulphate solution • 1M hydrochloric acid • 1 M zinc sulphate • Potassium nitrate solution • Beakers • Voltmeter • Hydrogen electrode	• Comprehensive secondary chemistry students book 4 pages 120-123 • Comprehensive chemistry teachers book 4 pages 68-69 • Secondary chemistry-KLB students book 4 page 129 • Foundation chemistry students' book 4 page 206	
5	**1-2**	Electro-chemistry	electrolysis	By the end of the lesson, the learner should be able to (i) Define electrolysis (ii) Explain the role of water in electrolysis	• Defining the terms electrolysis • Carrying out an experiment to investigate electrolysis of dilute sulphuric (VI) acid • Explaining the role of water in electrolysis	• Concentrated H_2SO_4 • Distilled water • 2 ignition tubes • Clamp and stand • 6V dc battery • Voltmeter • Improvised voltmeter • Wooden splint • Connecting wires • Crocodile chips • Carbon rods	• Comprehensive secondary chemistry students book 4 pages 125-127 • Comprehensive chemistry teachers book 4 pages 69-70 • Secondary chemistry-KLB students book 4 page 141 • Foundation chemistry students' book 4 page 218	

	3-4	Electro-chemistry	Factors affecting preferential discharge of ions	By the end of the lesson, the learner should be able to (i) State and explain the factors that affect the preferential discharge of ions during electrolysis	• Carry out experiments to investigate ionic • Concentrated of the electrolyte • Recording observations • Discussions based on observations • Listing the factors that affect discharge of ions	• Sodium chloride • Distilled water • Magnesium sulphate solution • Battery improvised voltmeter • Weighing balance • Measuring cylinder • Wooden splints • Blue litmus paper	• Comprehensive secondary chemistry students book 4 pages 127-132 • Comprehensive chemistry teachers book 4 pages 70-71 • Secondary chemistry-KLB students book 4 page 153 • Foundation chemistry students' book 4 page 218	
	5	Electro-chemistry	Quantitative analysis of electrolysis	By the end of the lesson, the learner should be able to (i) Relate the quantity of electricity based to the amount of substances liberated at the electrolyses	• Carrying out the experiment to investigate quantity of electricity used to deposit copper • Recording observations • Discussion based on the observations • Calculating the quantity of electricity used and mass deposited at electrodes	• Two clean strips of copper • 0.1M copper sulphate solution • Propanone • Ethanol • Rheostat • Ammeter • Stopwatch/clock • Crocodile clips • Switch	• Comprehensive secondary chemistry students book 4 pages 132-135 • Comprehensive chemistry teachers book 4 pages 71 • Secondary chemistry-KLB students book 4 page 160 • Foundation chemistry students' book 4 page 218	
6	**1-2**	Electro-chemistry	Application of electrolysis	By the end of the lesson, the learner should be able to (i) Describe some applications of electrolysis	• Carrying out experiments to show electroplating • Recording observations • Discussion based in observations • Listing applications of electrolysis	• Nickel and copper strips • 2M sodium hydroxide solution • Distilled water • Connecting wires • switches	• Comprehensive secondary chemistry students book 4 pages 135-139 • Comprehensive chemistry teachers book 4 pages 72 • Secondary chemistry-KLB students book 4 page 155	

							• Foundation chemistry students' book 4 page 243	
	3	Metals	Chief metal ores of sodium iron, aluminum zinc, lead and copper	By the end of the lesson, the learner should be able to (i) Name the chart ores of some metals	• Discussion on chief metal ores • Listing the chief metal ores	• The periodic table	• Comprehensive secondary chemistry students book 4 pages 146 • Comprehensive chemistry teachers book 4 pages 94-95 • Secondary chemistry-KLB students book 4 page 168 • Foundation chemistry students' book 4 page 260	
	4-5	Metals	Extraction of metals	By the end of the lesson, the learner should be able to (i) Describe and explain the general methods used in extraction of metals for their ores	• Discussion on the extraction of metals • Drawing of the froth-flotation process	• Chart on the froth-flotation process	• Comprehensive secondary chemistry students book 4 pages 146-149 • Comprehensive chemistry teachers book 4 pages 94-95 • Secondary chemistry-KLB students book 4 page 169 • Foundation chemistry students' book 4 page 260	
7	**1-2**	Metals	Sodium occurrence, extraction properties and uses	By the end of the lesson, the learner should be able to (i) Describe the methods for the extraction of sodium from its ores	• Describing the method of extracting sodium from its ores • Drawing the downs' cell • Writing the anode from cathode reactions • Listings the uses of sodium	• Charts showing downs' cell diagram • Sodium metal • Litmus solutions • Test tube • A pair of tongs • Aluminum foil	• Comprehensive secondary chemistry students book 4 pages 149-152 • Comprehensive chemistry teachers book 4 pages 94-96	

				(ii) Explain the physical and chemical properties of sodium (iii) List uses of sodium		• Trough	• Secondary chemistry- KLB students book 4 page 170-171 • Foundation chemistry students' book 4 page 261	
	3	metals	Aluminum occurrence and extraction	By the end of the lesson, the learner should be able to (i) Describe suitable methods for the extraction of aluminum from its ores	• Explaining the occurrence of aluminum • Describing the suitable method of aluminum extraction • Writing the anode and cathode reactions	• Chart showing the flow diagram for aluminum extraction	• Comprehensive secondary chemistry students book 4 pages 152-154 • Comprehensive chemistry teachers book 4 pages 94-97 • Secondary chemistry- KLB students book 4 page 171-173 • Foundation chemistry students' book 4 page 267	
	4-5	Metals	Properties and uses of aluminum	By the end of the lesson, the learner should be able to (i) State the chemical and physical properties of aluminum and its uses	• Demonstration of experiments to investigate reactions of aluminum • Recording observations • Discussion based on observations • Writing of relevant chemical equations	• Aluminum foil • Dilute HCL • Dilute nitric acid • Dilute sulphuric acid • Concentrated nitric acid • Concentrated sulphuric acid • Test tubes • Test tube racks • Measuring cylinder	• Comprehensive secondary chemistry students book 4 pages 155-158 • Comprehensive chemistry teachers book 4 pages 96-97 • Secondary chemistry- KLB students book 4 page 195 • Foundation chemistry students' book 4 page 269-270	
8	**1-2**	Metals	Iron occurrence and extraction	By the end of the lesson, the learner should be able to	• Explaining the occurrence of iron • Discussion on the extraction of iron	• Chart showing blast furnace and chemical	• Comprehensive secondary chemistry students book 4 pages 158-160	

				(i) Explain the occurrence of iron (ii) Describe and explain the method of extraction of iron	• Drawing of blast furnace • Writing the relevant chemical equations	equations involved	• Comprehensive chemistry teachers book 4 pages 94 • Secondary chemistry-KLB students book 4 page 173 • Foundation chemistry students' book 4 page 277	
	3-4	metals	Properties and use of iron	By the end of the lesson, the learner should be able to (i) Describe and explain physical and chemical properties of iron (ii) List uses of iron and its alloys	• Carrying out experiments to investigate properties of iron • Recording observations • Discussions based on observations • Writing relevant chemical equations • Listing uses of iron and its alloys	• Iron powder • Combustion tube • Test tube rack • Bunsen burner • Spatula • Dilute and concentrated hydrochloric acids • Dilute and concentrated sulphuric acids	• Comprehensive secondary chemistry students book 4 pages 160-164 • Comprehensive chemistry teachers book 4 pages 94 • Secondary chemistry-KLB students book 4 page 196 • Foundation chemistry students' book 4 page 282	
	5	Metals	Copper occurrence and extraction	By the end of the lesson, the learner should be able to (i) Explain the occurrence of copper (ii) Select and describe suitable method for extraction of copper	• Explaining the occurrence of copper • Describing suitable methods of copper extraction from pyrates ($CuFeS_2$ • Writing relevant chemical equations	• Charts on blast finance for the extraction of copper	• Comprehensive secondary chemistry students book 4 pages 164-166 • Comprehensive chemistry teachers book 4 pages 94 • Secondary chemistry-KLB students book 4 page 181	

							• Foundation chemistry students' book 4 page 287	
9	**1-2**	Metals	Properties of copper and its uses	By the end of the lesson, the learner should be able to (i) Describe and explain physical and chemical properties of copper and list its uses	• Carrying out experiments to investigate reactions of copper • Recording observations • Discussion based on observations • Writing relevant chemical equations	• Copper powder • Crucible • Pair of tongs • Spatula • Tripod stand • Source of heat • Dilute and concentrated acids (nitric acid, sulphuric acid and hydrochloric acid	• Comprehensive secondary chemistry students book 4 pages 166-168 • Comprehensive chemistry teachers book 4 pages 97 • Secondary chemistry-KLB students book 4 page 197 • Foundation chemistry students' book 4 page 289	
	3-4	metals	Zinc: occurrence of extraction, properties and uses	By the end of the lesson, the learner should be able to (i) Describe and explain the occurrence, extraction properties and use of zinc	• Describing the occurrence, extraction and physical properties of zinc • Carrying our experiment to investigate reaction of zinc with mineral acid • Explaining the chemical properties of zinc • Listing uses of zinc • Writing relevant equations	• Aluminum sheet • Mineral acids • Test tubes • Test tube holder • Spatula • Rest tube holder • Small beaker • 5 cm^3 measuring cylinder • Test tube with arm	• Comprehensive secondary chemistry students book 4 pages 169-172 • Comprehensive chemistry teachers book 4 pages 94,98 • Secondary chemistry-KLB students book 4 page 175 • Foundation chemistry students' book 4 page 273	
	5	metals	Pollution of the environment	By the end of the lesson, the learner should be able to (i) Describe the effects of	• Discussion on pollution of the environment by industrial production processes	• Articles and photographs from scientific journals	• Comprehensive secondary chemistry students book 4 pages 176	

				industrial production process of metal on the environment			• Comprehensive chemistry teachers book 4 pages 96-98 • Secondary chemistry-KLB students book 4 page 197 • Foundation chemistry students' book 4 page 292	
10	**1-2**	Metals	Lead: occurrence, extraction properties and uses	By the end of the lesson, the learner should be able to describe and explain the occurrence, extraction properties and uses of lead	• Describing occurrence, extraction and physical properties of lead • Explaining the chemical properties of lead • Carrying out experiments to investigate reactions of lead with solute acids and chlorine • Recording observations • Discussions based on observations • Writing relevant chemical equations	• Dilute acids • Concentrated acids • Lead • Test tubes • Test tube holders • Measuring cylinders	• Comprehensive secondary chemistry students book 4 pages 172-174 • Comprehensive chemistry teachers book 4 pages 94,98 • Secondary chemistry-KLB students book 4 page 179 • Foundation chemistry students' book 4 page 285	
	3	Alkanols and alkanoic acids	Naming and drawing structure of alkanols	By the end of the lesson, the learner should be able to name and draw the structure of simple alkanols	• Drawing the structures of alkanols • Assigning names to alkanol molecules	• Charts showing structures of alkanols	• Comprehensive secondary chemistry students book 4 pages 180-182 • Comprehensive chemistry teachers book 4 pages 107-109 • Secondary chemistry-KLB students book 4 page 206	

							• Foundation chemistry students' book 4 page 305	
	4	Alkanols and alkanoic acids	Preparation and properties of alkanols	By the end of the lesson, the leaner should be able to (i) Describe the preparations and explain the physical and chemical properties of alkanols	• Carrying out experiments on the preparations of ethanol • Recording observation • Discussion based on observations • Discussion on physical properties of alkanols • Describing chemical properties of Alkanols	• Glucose, yeast • Water- lime water • Round bottomed flask • Measuring cylinder • Thermometer (-10^0C-110^0C) • Broken porcelain • Air-lock apparatus	• Comprehensive secondary chemistry students book 4 pages 182-188 • Comprehensive chemistry teachers book 4 pages 107-111 • Secondary chemistry-KLB students book 4 page 210 • Foundation chemistry students' book 4 page 307	
	5	Alkanols and alkanoic acids	Uses of alkanols	By the end of the lesson, the learner should be able to (i) State and explain the uses of some alkanols	• iscussion on uses of alkanols • Listing uses of alkanols	• Methanol • Ethanol • Chart showing the uses of alkanols	• Comprehensive secondary chemistry students book 4 pages 189-190 • Comprehensive chemistry teachers book 4 pages 115 • Secondary chemistry-KLB students book 4 page 218 • Foundation chemistry students' book 4 page 327	

CHEMISTRY FORM 4 SCHEMES OF WORK – TERM 3

WEEK	LESSON	TOPIC	SUB - TOPIC	OBJECTIVES	LEARNING/TEACHING ACTIVITIES	LEARNING/TEACHING RESOURCES	REFERENCES	
1	1-2	Alkanols and Alkanoic acids	Naming and drawing structure of alkanoic acids	By the end of the lesson, the learner should be able to (i) Name and draw the structure of simple alkanoic acids	• Drawing structures of alkanoic acids • Assigning names to alkanoic molecules	• Chart showing structures of alkanoic acids	• Comprehensive secondary chemistry students book 4 pages 189-190 • Comprehensive chemistry teachers book 4 pages 115 • Secondary chemistry-KLB students book 4 page 218 • Foundation chemistry students' book 4 page 327	
	3-4	Alkanols And alkanoic acids	Preparation and properties of alkanoic acids	By the end of the lesson, the learner should be able to (i) Describe the preparation and explain the physical and chemical properties of alkanoic acids	• Demonstration of experiments to prepare ethanoic acids • Recording observations • Discussion based on observations • Writing relevant chemical equations • Describing physical properties of alkanoic acids • Explaining chemical properties of alkanoic acids	• Ethanol • Concentrated sulphuric acid • Potassium dichromate • Distilled water • Round bottomed flask • Leibig condenser • Measuring cylinder • Thermometer beaker •	• Comprehensive secondary chemistry students book 4 pages 193-195 • Comprehensive chemistry teachers book 4 pages 109-111 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	
	5	Alkanols and alkanoic acids	Uses of alkanoic acids	By the end of the lesson, the learner should be able to	• Discussion on uses of alkanoic acids • Writing relevant chemical equations	• Chart showing uses of alkanoic acids • Ethanoic acids	• Comprehensive secondary chemistry students book 4 pages 196-197	

				(i) State and explain the uses of alkanoic acids			• Comprehensive chemistry teachers book 4 pages 115 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	
2	**1-2**	Alkanols and alkanoic acids	Detergents	By the end of the lesson, the learner should be able to (i) Describe and explain preparation and properties of detergents	• Carrying out experiments on preparation of soaps and soap less detergents • Recording observations • Discussion based on observations • Explaining the properties of soaps and soap less detergents	• 4M sodium hydroxide • Sodium chloride • Castor oil • Distilled water • Concentrated sulphuric acid • Bathing tube • Bunsen burner • Glass rod • Spatula • Measuring cylinder	• Comprehensive secondary chemistry students book 4 pages 197-200 • Comprehensive chemistry teachers book 4 pages 112 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	
	3-4	Alkanols and alkanoic acids	Uses of detergents and effects of hard water on detergents	By the end of the lesson, the learner should be able to (i) State and explain the uses of detergents (ii) Explain the effects of hard water on detergents	• Explaining the uses of detergent • Carrying out experiments to show effects of hard metal on soaps and soap less detergents • Recording observations • Discussion on the effects of hard water on detergents	• Soaps • Soap less detergents • Tap water • Distilled water • Warm water • beakers	• Comprehensive secondary chemistry students book 4 pages 200 • Comprehensive chemistry teachers book 4 pages 112 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	
	5	Alkanols and alkanoic acids	Natural polymers	By the end of the lesson, the learner should be able to	• Listing examples of natural polymers • Drawing structures of cellulose natural	• Chart showing structure of natural polymers	• Comprehensive secondary chemistry students book 4 pages 101-202	

				(i) List some natural polymers and state their uses	rubber and vulcanized rubber • Listing uses of natural polymers	• Chart on uses of natural polymers	• Comprehensive chemistry teachers book 4 pages 113-114 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	
3	**1-2**	Alkanols and alkanoic acids	Synthetic polymers and fibers and their uses	By the end of the lesson, the learner should be able to (i) List some synthetic polymers and fibers (ii) Describe the preparation and properties of synthetic polymers (iii) State the uses of synthetic polymers	• Carrying out experiments to make nylon 66 • Recording observations • Discussion based on observations • Writing relevant chemical equations • Describing properties of synthetic polymers • Listing the uses of synthetic polymers	• 2M sodium hydroxide • Ethanol solution of hexane 1:6-dramine • Pair of tongs • Test tube • Bunsen burner	• Comprehensive secondary chemistry students book 4 pages 203-211 • Comprehensive chemistry teachers book 4 pages 113-114 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	
	3	Alkanols and alkanoic acids	Structure of polymers	By the end of the lesson, the learner should be able to (i) Identify the structure of a polymer given the monomer	• Discussions on structures of polymers • Drawing polymers from given monomers	• Chart showing structures of polymers and monomers	• Comprehensive secondary chemistry students book 4 pages 204-205 • Comprehensive chemistry teachers book 4 pages114 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	

	4-5	Alkanols and alkanoic acid	Advantages and disadvantages of sythentic material over natural polymers	By the end of the lesson, the learner should be able to (i) State the advantages and disadvantages of synthetic materials compared to those of natural origin in terms of their structure and properties	• Discussions on sythentic and natural polymers • Listing the advantage and disadvantages of sythentic natural polymers	• Chart showing advantages and disadvantages of synthetic polymers against natural polymers	• Comprehensive secondary chemistry students book 4 pages 212,214 • Comprehensive chemistry teachers book 4 pages114 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	
4	**1-2**	Radio- activity	Introduction: stability of isotopes of elements	By the end of the lesson, the leaner should be able to (i) Define radio-activity half-life, radio-isotopes and nuclides (ii) Name the particles emitted during radioactive decay	• Defining the terms radioactivity, half-life, radio-isotopes and nuclides • Naming particles emitted during radioactive decay	• Chart on determinations of half-life, radio-isotopes • Chart on particles emitted during radio decay	• Comprehensive secondary chemistry students book 4 pages 220-221 • Comprehensive chemistry teachers book 4 pages126-127 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	
	3-4	Radio-activity	Radio active decay	By the end of the lesson, the learner should be able to (i) State types of radio-activity (ii) List the properties of particles emitted during radio-active decay	• Discussion on types of particles emitted during radio-active decay • Listing properties of particles emitted during radio active decay	• Chart showing simple nuclear equation	• Comprehensive secondary chemistry students book 4 pages 222-225 • Comprehensive chemistry teachers book 4 pages127-128 • Secondary chemistry-KLB students book 4 page	

							• Foundation chemistry students' book 4 page	
	5	Radioactivity	Half-life of radio-isotopes	By the end of the lesson, the learner should be able to (i) Carry out simple calculations involving half-life ($\&^1/_2$)	• Discussion on half-life ($\&^1/_2$) • Calculating half life ($\&^1/_2$)	• Charts showing graphs on half life's of different elements	• Comprehensive secondary chemistry students book 4 pages 225-228 • Comprehensive chemistry teachers book 4 pages128 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	
5	**1-2**	Radio-activity	Nuclear equations	By the end of the lesson, the learner should be able to (i) Write a balanced nuclear equations	• Discussion on nuclear equations • Writing balanced nuclear equations	• Chart on balance nuclear equations	• Comprehensive secondary chemistry students book 4 pages 228-231 • Comprehensive chemistry teachers book 4 pages128 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	
	3-4	Radio activity	Nuclear fission and fusion	By the end of the lesson, the learner should be able to (i) Distinguish between nuclear fission and fusion	• Discussion on nuclear fission and fusion • Calculating the energy released in the process • Distinguishing between nuclear fission and fusion	• Chart showing controlled and uncontrolled fission reactions	• Comprehensive secondary chemistry students book 4 pages 232-237 • Comprehensive chemistry teachers book 4 pages129 • Secondary chemistry-KLB students book 4 page	

							• Foundation chemistry students' book 4 page	
	5	Radio activity	Applications of radio-isotopes	By the end of the lesson, the learner should be able to (i) State uses of some radio-isotopes (ii) List the halogens associated with radioactivity	• Discussion on uses and changes of radio-activity • Writing simple nuclear equations	• Chart on uses and dangers of radioactivity	• Comprehensive secondary chemistry students book 4 pages 238-243 • Comprehensive chemistry teachers book 4 pages129 • Secondary chemistry-KLB students book 4 page • Foundation chemistry students' book 4 page	