**FORM 4 CHEMISTRY SCHEME OF WORK**

**TERM 2**

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| **WK** | **LSN** | **TOPIC** | **SUB-TOPIC** | **OBJECTIVES** | **T/L ACTIVITIES** | **T/L AIDS** | **REFERENCE** | **REMARKS** |
| 1 | **Opening of School** | | | | | | | |
| 2 | 1 | RATES OF REACTION & REVERSIBLE REACTIONS. | Effect of temperature of reactants on rate of reaction. | By the end of the lesson, the learner should be able to:  Explain the effect of temperature on rate of reaction. | Group experiments: investigate the effects of temperature on the rate of reaction of sodium thiosulphate with dilute HCl. Sketch and interpret relevant graphs. Discuss the collision theory and effects of activation energy. | Sodium thiosulphate heated at different temperatures, dilute HCl, stopwatches. Graph papers. | K.L.B. BK IV Pages 80-83 |  |
| 2 | RATES OF REACTION & REVERSIBLE REACTIONS. | Effect of change in surface area of reactants on the rate of a reaction. | By the end of the lesson, the learner should be able to:  Explain the effect of change in surface area on the rate of a reaction. | Group experiment/ teacher demonstration.  Compare reactions of marble chips with dilute HCl and that of marble chips powder with equally diluted HCl.  Collect evolved gas in each case.  Teacher asks probing questions related to the observations made. | Marble chips, marble chips powder, syringes, conical flasks with stoppers, 1M HCl. | K.L.B. BK IV Pages 83-85 |  |
| 3 | RATES OF REACTION & REVERSIBLE REACTIONS. | Effect of a suitable catalyst on the rate of a reaction | By the end of the lesson, the learner should be able to:  Explain effects of a suitable catalyst on the rate of a reaction. | Teacher demonstration: preparation and collection of oxygen gas without using a catalyst, then using manganese (IV) oxide as a catalyst. Explain the results in terms of activation energy. | Hydrogen peroxide, manganese (IV) oxide. | K.L.B. BK IV Pages 85-88 |  |
| 4 | RATES OF REACTION & REVERSIBLE REACTIONS. | Effect of light on rate of specific reactions. | By the end of the lesson, the learner should be able to:  Identify reactions that are affected by light. | Teacher demonstration: decomposition of silver bromide in the presence of light. Mention other examples of reactions affected by light. | Silver bromide. | K.L.B. BK IV Pages 89-91 |  |
| 5 | RATES OF REACTION & REVERSIBLE REACTIONS. | Reversible reactions. | By the end of the lesson, the learner should be able to:  Write down equations for reversible reactions. | Q/A: review temporary and permanent changes. Teacher demonstration: heating crystals of hydrated copper (II) sulphate, then ?hydrating? them. Write the corresponding chemical equations. Give further examples of reversible reactions. | Crystals of hydrated copper (II) sulphate. | K.L.B. BK IV Pages 91-93 |  |
| 3 | 1 | RATES OF REACTION & REVERSIBLE REACTIONS. | State of equilibrium in chemical reactions. | By the end of the lesson, the learner should be able to:  Define the term equilibrium as used in reversible reactions. Write down equations of reversible reactions in a state of equilibrium. | Brief discussion, giving examples of chemical equations for reversible reactions. | student book | K.L.B. BK IV Pages 94-95 |  |
| 2 | RATES OF REACTION & REVERSIBLE REACTIONS. | Le Chatelier?s Principle. | By the end of the lesson, the learner should be able to:  State Le Chatelier?s Principle. | Investigate the effect of change of concentration of reactants on equilibrium. Add 2M sodium hydroxide in steps to bromine water. Make and record observations. Discuss the results leading to  Le Chatelier?s Principle. | Add 2M sodium hydroxide, | K.L.B. BK IV Pages 95-97 |  |
| 3 | RATES OF REACTION & REVERSIBLE REACTIONS. | Effect of change of pressure and temperature on equilibrium shift. The Haber Process. | By the end of the lesson, the learner should be able to:  Explain the effect of change of pressure & te,perature on equilibrium shift. Explain the concept optimum conditions of a chemical equilibrium. Explain factors that change the position of equilibrium of the Harber process. | Q/A: review kinetic theory of matter. Q/A & discussion on effect of change of pressure / temperature on shifting of equilibrium; giving specific examples of chemical equations.  Written assignment.  Q/A and detailed discussion on change of pressure, temperature, concentration of ammonia and effect of presence of a suitable catalyst on the Haber process. | student book | K.L.B. BK IV Pages 97-101 |  |
| 4 | RATES OF REACTION & REVERSIBLE REACTIONS. | The Contact Process. | By the end of the lesson, the learner should be able to:  Explain how change of temperature and pressure affect rate of manufacture of sulphur (VI) acid. | Probing questions and brief discussion.  Assignment. | student book | K.L.B. BK IV Pages 103-104 |  |
| 5 | ELECTRO-CHEMISTRY. | Redox reactions. | By the end of the lesson, the learner should be able to:    Describe redox reactions in terms of gain / loss of electrons. Identify oxidizing / reducing agents involved in redox reactions. | Q/A: review cations, anions and charges. Write down ionic half equations and identify reducing / oxidizing agents. | student book | K.L.B. BK IV Pages 108-9 |  |
| 4 | 1 | ELECTRO-CHEMISTRY. | Oxidizing Numbers. | By the end of the lesson, the learner should be able to:  Outline rules of assigning oxidation numbers. Determine the oxidation numbers of an element in a given compound. Explain the use of oxidation numbers in naming compounds. | Exposition and giving specific examples. Work out oxidizing number of elements in given compounds. Copy and complete a table of compounds containing elements that more than one oxidation number. | student book | K.L.B. BK IV Pages 109-116 |  |
| 2 | ELECTRO-CHEMISTRY. | Displacement reactions. | By the end of the lesson, the learner should be able to:  Explain change of oxidation numbers during redox / displacement reactions. Arrange elements in order of their reducing power. | Class standard experiments: reacting metals with solutions containing metal ions. Taking note of reactions and those that do not take place; and tabulating the results. | Metals: Ca, Na, Zn, Fe, Pb, and Cu. Solutions containing Ca2+, Mg2+, Zn2+, Fe2+. | K.L.B. BK IV Pages 116-120 |  |
| 3 | ELECTRO-CHEMISTRY. | Displacement reactions. | By the end of the lesson, the learner should be able to:  Explain change of oxidation numbers during redox / displacement reactions. Arrange elements in order of their reducing power. | Class standard experiments: reacting metals with solutions containing metal ions. Taking note of reactions and those that do not take place; and tabulating the results. | Metals: Ca, Na, Zn, Fe, Pb, and Cu. Solutions containing Ca2+, Mg2+, Zn2+, Fe2+. | K.L.B. BK IV Pages 116-120 |  |
| 4 | ELECTRO-CHEMISTRY. | The oxidizing power of an element. | By the end of the lesson, the learner should be able to:  Arrange elements in order of their oxidizing power. | Teacher demonstration / group expts: Adding halogens to solutions containing halide ions. Tabulate the results. Discuss the results and arrive at the oxidizing power series of halogens. | Halogens: Cl2 (g),  Br2 (l),  I2 (s).  Halides:  KCl, KBr, KI. | K.L.B. BK IV Pages 120-122 |  |
| 5 | ELECTRO-CHEMISTRY. | Cell diagrams. | By the end of the lesson, the learner should be able to:  Define the terms electrode, potential and e.m.f. of an electrochemical cell. Describe components of a cell diagram. Draw cell diagrams using correct notations. | Teacher demonstration: Zinc/ copper cell. Q/A & discussion: changes in oxidation numbers. Exposition: cell diagram and deducing the direction of electron flow. | Zinc/ copper cell. | K.L.B. BK IV Pages 123-128 |  |
| 5 | 1 | ELECTRO-CHEMISTRY. | Standard Electrode Potentials. | By the end of the lesson, the learner should be able to:  Identify standard conditions for measuring electrode potentials. Define the term standard electrode potential of a cell. Write half reactions of electrochemical cells. | Descriptive and expository approaches: teacher exposes new concepts. | student book | K.L.B. BK IV Pages 129-131 |  |
| 2 | ELECTRO-CHEMISTRY. | Standard electrode potential series. | By the end of the lesson, the learner should be able to:  Recall the order of standard electrode potentials. Compare oxidizing and reducing powers of substances. | Q/A: review reactivity series, oxidizing agent, reducing agent. Exposition: the order of standard electrode potentials. Discussion: oxidizing and reducing powers of substances. | student book | K.L.B. BK IV Pages 131-133 |  |
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| 4 | ELECTRO-CHEMISTRY. | Emf of a cell. | By the end of the lesson, the learner should be able to:  Calculate emf of a cell using standard electrodes potentials. | Q/A: review half-cells. Worked examples; supervised practice. Assignment. | student book | K.L.B. BK IV Pages 133-136 |  |
| 5 | ELECTRO-CHEMISTRY. | Possibility of a reaction to take place. | By the end of the lesson, the learner should be able to:  Predict whether a reaction will take place or not using standard electrode potentials. | Worked examples. Oral exercise. Assignment. | student book | K.L.B. BK IV Pages 136-137 |  |
| 6 | 1 | ELECTRO-CHEMISTRY. | Primary and secondary chemical cells. | By the end of the lesson, the learner should be able to:  Describe the functioning of primary and secondary chemical cells. | Exposition of new concepts and brief discussion Assignment. | student book | K.L.B. BK IV Pages 138-141 |  |
| 2 | ELECTRO-CHEMISTRY. | Electrolysis of dilute NaCl. | By the end of the lesson, the learner should be able to:  Define the term electrolysis. Explain the concept of preferential discharge of ions. | Teacher demonstration: electrolysis of dilute sodium chloride with carbon electrodes. Test for gases collected. Write down equations of reactions at each electrode. Discussion: preferential discharge of ions at electrodes. | Dilute sodium chloride voltameter. | K.L.B. BK IV Pages 141-144 |  |
| 3 | ELECTRO-CHEMISTRY. | Electrolysis of dilute NaCl. | By the end of the lesson, the learner should be able to:  Define the term electrolysis. Explain the concept of preferential discharge of ions. | Teacher demonstration: electrolysis of dilute sodium chloride with carbon electrodes. Test for gases collected. Write down equations of reactions at each electrode. Discussion: preferential discharge of ions at electrodes. | Dilute sodium chloride voltameter. | K.L.B. BK IV Pages 141-144 |  |
| 4 | ELECTRO-CHEMISTRY. | Electrolysis of brine. | By the end of the lesson, the learner should be able to:  Identify products of electrolysis of brine. | Teacher demonstration/ group experiments. Test for the products of electrolysis. Write relevant equations. | Brine voltameter. | K.L.B. BK IV Pages 144-146 |  |
| 5 | ELECTRO-CHEMISTRY. | Electrolysis of dilute sulphuric (VI) acid. Factors affecting electrolysis. | By the end of the lesson, the learner should be able to:  Identify products of electrolysis of dilute sulphuric (VI) acid. Explain factors that affect electrolytic products discharged at electrodes. | Teacher demonstration/ group experiments. Test for the products of electrolysis. Write relevant equations. Q/A: review the electrochemical series of elements. Teacher writes down order of ease of discharge of ions at electrodes. Discussion: other factors; giving suitable examples. | Sulphuric acid voltameter. student book | K.L.B. BK IV Pages 146-148 |  |
| 7 | 1 | ELECTRO-CHEMISTRY. | Application of electrolysis. | By the end of the lesson, the learner should be able to:  Describe some applications of electrolysis. | Probing questions and brief discussion on applications of electrolysis. Practical assignment on electrolysis: electroplating an iron nail with a suitable metal. | Suitable voltameter. | K.L.B. BK IV Pages 155-7 |  |
| 2 | ELECTRO-CHEMISTRY. | Faraday?s law of electrolysis. | By the end of the lesson, the learner should be able to:  State Faraday?s law of electrolysis. Solve problems related to Faraday?s law of electrolysis. | Discuss above results, leading to Faraday?s law of electrolysis.  Worked examples.  Assignment. | Weighing balance, stop watch, copper sulphate voltameter. | K.L.B. BK IV Pages 161-4 |  |
| 3 | METALS | Ores of some metals. | By the end of the lesson, the learner should be able to:    Name the chief ores of some metals. | Exposition and brief discussion. |  | K.L.B. BK IV Pages 168-9 |  |
| 4 | METALS | Occurrence and extraction of sodium. | By the end of the lesson, the learner should be able to:  Describe occurrence and extraction of sodium. | Oral questions on electrolysis and equations at electrodes. Brief discussion on occurrence and extraction. | Chart: Down?s cell. | K.L.B. BK IV Pages 170-171 |  |
| 5 | METALS | Occurrence and extraction of aluminium. | By the end of the lesson, the learner should be able to:  Describe occurrence and extraction of aluminium. | Brief discussion. Write relevant chemical equations. | student book | K.L.B. BK IV Pages 171-3 |  |
| 8 | Mid Term Exams and Break | | | | | | | |
| 9 | 1 | METALS | Occurrence and extraction of iron. | By the end of the lesson, the learner should be able to:  Describe occurrence and extraction of iron. | Brief discussion. Write relevant chemical equations. | Chart: Blast furnace. | K.L.B. BK IV Pages 173-5 |  |
| 2 | METALS | Occurrence and extraction of zinc. | By the end of the lesson, the learner should be able to:  Describe occurrence and extraction of zinc by electrolysis and reduction methods. | Brief discussion. Write relevant chemical equations. | Flow chart: extraction of Zinc. | K.L.B. BK IV Pages 175-9 |  |
| 3 | METALS | Occurrence and extraction of zinc. | By the end of the lesson, the learner should be able to:  Describe occurrence and extraction of zinc by electrolysis and reduction methods. | Brief discussion. Write relevant chemical equations. | Flow chart: extraction of Zinc. | K.L.B. BK IV Pages 175-9 |  |
| 4 | METALS | Extraction of lead. | By the end of the lesson, the learner should be able to:  Explain how lead is extracted. | Q/A & brief discussion. Write balanced chemical equations leading to extraction of lead. | Flow chart: extraction of lead. | K.L.B. BK IV Pages 179-80 |  |
| 5 | METALS | Occurrence and extraction of copper. | By the end of the lesson, the learner should be able to:  Describe extraction of copper. | Q/A & brief discussion. Write balanced chemical equations leading to extraction of copper. | Flow chart: extraction of copper. | K.L.B. BK IV Pages 181-183 |  |
| 10 | 1 | METALS | Physical properties of some metals. | By the end of the lesson, the learner should be able to:  State general properties of metals. Explain the difference in physical properties of metals. | Compare physical properties of some metals as summarized in a chart. Q/A & discussion based on physical properties. | student book | K.L.B. BK IV Pages 183-4 |  |
| 2 | METALS | Reaction of metals with oxygen. | By the end of the lesson, the learner should be able to:  Explain effect of burning metals in air. | Teacher demonstration / Group experiments. Burning some metals in air. Write relevant equations. Brief discussion. | Common lab. metals. | K.L.B. BK IV Pages 184-6 |  |
| 3 | METALS | Reaction of metals with oxygen. | By the end of the lesson, the learner should be able to:  Explain effect of burning metals in air. | Teacher demonstration / Group experiments. Burning some metals in air. Write relevant equations. Brief discussion. | Common lab. metals. | K.L.B. BK IV Pages 184-6 |  |
| 4 | METALS | Reaction of metals with cold water and steam. | By the end of the lesson, the learner should be able to:  Describe reaction of metals with cold water and steam.  Arrange the metals in order of reactivity with cold water and steam. | Class experiments:  Investigate reaction of some metals with cold water and steam. Analyse the results. | Metals: Al, Zn, Fe, Cu. | K.L.B. BK IV Pages 186-9 |  |
| 5 | METALS | Reaction of metals with cold water and steam. | By the end of the lesson, the learner should be able to:  Describe reaction of metals with cold water and steam.  Arrange the metals in order of reactivity with cold water and steam. | Class experiments:  Investigate reaction of some metals with cold water and steam. Analyse the results. | Metals: Al, Zn, Fe, Cu. | K.L.B. BK IV Pages 186-9 |  |
| 11 | 1 | METALS | Reaction of metals with chlorine. | By the end of the lesson, the learner should be able to:  Describe the reaction of metals with chlorine. | Teacher demonstration in a fume cupboard / in the open. Investigate reaction of metals with chorine  Write corresponding equations. | Metals: Al, Zn, Fe, Cu. | K.L.B. BK IV Pages 189-191 |  |
| 2 | METALS | Reaction of metals with chlorine. | By the end of the lesson, the learner should be able to:  Describe the reaction of metals with chlorine. | Teacher demonstration in a fume cupboard / in the open. Investigate reaction of metals with chorine  Write corresponding equations. | Metals: Al, Zn, Fe, Cu. | K.L.B. BK IV Pages 189-191 |  |
| 3 | METALS | Reaction of metals with acids. | By the end of the lesson, the learner should be able to:  Describe and explain reaction of metals with acids. | Group experiments: investigate reaction of metals with dilute acids. Teacher demonstration: investigate reaction of metals with concentrated acids. Discuss the observations made and write relevant chemical equations. | Metals: Al, Zn, Fe, Cu.  Acids; HCl, HNO3, H2SO4. | K.L.B. BK IV Pages 191-4 |  |
| 4 | METALS | Uses of metals. | By the end of the lesson, the learner should be able to:  State uses of some metals and alloys. | Q/A & brief discussion; Uses of Sodium, Aluminium, Zinc, Iron and Copper & some alloys. | student book | K.L.B. BK IV Pages 194-7 |  |
| 5 | METALS | Environmental effects of extraction of metals. | By the end of the lesson, the learner should be able to:  Identify some environmental effects of extraction of metals. | Oral questions and open discussion.  Assignment / Topic review. | student book | K.L.B. BK IV Pages 197-8 |  |
| 12 | 1 | ORGANIC CHEMISTRY II (ALKANES & ALKANOIC ACIDS) | Alkanols (Alcohols). | By the end of the lesson, the learner should be able to:     Identify the functional group of alkanols.  Explain formation of alkanol molecules. | Q/A: review alkanes, alkenes and alkynes.  Teacher exposes new concepts and links them with already known concepts. | student book | K.L.B. BK IV Page 205 |  |
| 2 | ORGANIC CHEMISTRY II (ALKANES & ALKANOIC ACIDS) | Nomenclature of alkanols. | By the end of the lesson, the learner should be able to:  Name and draw the structure of simple alkanols. | Guided discovery of naming system for alkanols. Draw and name structures of alkanols. | student book | K.L.B. BK IV Pages 206-8 |  |
| 3 | ORGANIC CHEMISTRY II (ALKANES & ALKANOIC ACIDS) | Isomerism in alkanols. | By the end of the lesson, the learner should be able to:  Describe positional and chain isomerism in alkanols. Explain formation of primary and secondary alkanols. | Q/A: review the terms positional and chain isomerism. Brief discussion on isomerism. Oral exercise: naming given organic compounds. Written exercise: writing structural formulae for isomers of organic compounds of a given molecular formula. | student book | K.L.B. BK IV Pages 208-10 |  |
| 4 | ORGANIC CHEMISTRY II (ALKANES & ALKANOIC ACIDS) | Preparation of ethanol in the lab. | By the end of the lesson, the learner should be able to:  Describe preparation of ethanol in the laboratory. | Group experiments / teacher demonstration.  Discuss the fermentation process. | Calcium hydroxide solution, sugar solution, yeast. | K.L.B. BK IV Pages 210-11 |  |
| 4-5 | ORGANIC CHEMISTRY II (ALKANES & ALKANOIC ACIDS) | Preparation of ethanol in the lab. | By the end of the lesson, the learner should be able to:  Describe preparation of ethanol in the laboratory. | Group experiments / teacher demonstration.  Discuss the fermentation process. | Calcium hydroxide solution, sugar solution, yeast. | K.L.B. BK IV Pages 210-11 |  |
| 13-14 | **End Term Exam and Closing** | | | | | | | |