CHEMISTRY FORM FOUR

TERM TWO -2020

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|  |  | SCHEME OF WORK FORM FOUR CHEMISTRY TERM TWO 2020 | | | | | | | | | |  |
| WK **NO** | L/ **NO** | TOPIC / **SUBTOPIC** | **LESSON / SPECIFIC** OBJECTIVES | | **TEACHING / LEARNING** ACTIVITIES | | **MATERIALS /**  **RESOURCES** | | REF. | | | REM. |
| 1 | 1 | ELECTRO-CHEMISTRY. Redox reactions. | 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. | |  | | K.L.B. BK IV  Pages 108-9 | | |  |
| 2 | Oxidizing Numbers. | 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. | |  | | K.L.B. BK IV  Pages 109-116 | | |  |
| 3,4 | Displacement reactions. | 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 | | |  |
| 5 | The oxidizing power of an element. | 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 | | |  |
| 2 | 1 | Cell diagrams. | 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 | | |  |
| 2 | Standard Electrode Potentials. | 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. | |  | | K.L.B. BK IV  Pages 129-131 | | |  |
| 3,4 | Standard electrode potential series. | 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. | |  | | K.L.B. BK IV  Pages 131-133 | | |  |
| 5 | Emf of a cell. | Calculate emf of a cell using standard electrodes potentials. | | Q/A: review half-cells.  Worked examples; supervised practice.  Assignment. | |  | | K.L.B. BK IV  Pages 133-136 | | |  |
| 3 | 1 | Possibility of a reaction to take place. | Predict whether a reaction will take place or not using standard electrode potentials. | | Worked examples.  Oral exercise.  Assignment. | |  | | K.L.B. BK IV  Pages 136-137 | | |  |
| 3 | 2 | Primary and secondary chemical cells. | Describe the functioning of primary and secondary chemical cells. | | Exposition of new concepts and brief discussion  Assignment. | |  | | K.L.B. BK IV  Pages 138-141 | | |  |
| 3,4 | Electrolysis of dilute NaCl. | 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 | | |  |
| 5 | Electrolysis of brine. | 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 | | |  |
| 4 | 1 | Electrolysis of dilute sulphuric (VI) acid. | Identify products of electrolysis of dilute sulphuric (VI) acid. | | Teacher demonstration/ group experiments.  Test for the products of electrolysis.  Write relevant equations. | | Sulphuric acid voltameter. | | K.L.B. BK IV  Pages 146-148 | | |  |
| 2 | Factors affecting electrolysis. | Explain factors that affect electrolytic products discharged at electrodes. | | 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. | |  | | K.L.B. BK IV  Pages 153-5 | | |  |
| 4 | 3 | Application of electrolysis. | 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 | | |  |
| 4 | Faraday’s law of electrolysis. | Determine quantity of electricity required to deposit one mole of a metal | | Group experiments: record initial mass of cathode electrode, final mass, time taken, current flowing.  Calculate quantity of electricity using the equation Q = It. | | Weighing balance, stop watch, copper sulphate voltameter. | | K.L.B. BK IV  Pages 160-161 | | |  |
| 5 | Faraday’s law of electrolysis. | 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 | | |  |
| 5 | 1 | C.A.T. | | |  | |  | |  | | |  |
| 2 | METALS Ores of some metals. | Name the chief ores of some metals. | | Exposition and brief discussion. | |  | | K.L.B. BK IV  Pages 168-9 | | |  |
| 3 | Occurrence and extraction of sodium. | 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 | | |  |
|  | 4 | Occurrence and extraction of aluminium. | Describe occurrence and extraction of aluminium. | | Brief discussion.  Write relevant chemical equations. | |  | | K.L.B. BK IV  Pages 171-3 | | |  |
| 5 | Occurrence and extraction of iron. | Describe occurrence and extraction of iron. | | Brief discussion.  Write relevant chemical equations. | | Chart: Blast furnace. | | K.L.B. BK IV  Pages 173-5 | | |  |
| 6 | 1,2 | Occurrence and extraction of zinc. | 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 | Extraction of lead. | 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 | | |  |
| 4 | Occurrence and extraction of copper. | 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 | | |  |
| 5 | Physical properties of some metals. | 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. | |  | | K.L.B. BK IV  Pages 183-4 | | |  |
| 7 | 1,2 | Reaction of metals with oxygen. | 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 | | |  |
|  | 3,4 | Reaction of metals with cold water and steam. | 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 | | |  |
| 5,1 | Reaction of metals with chlorine. | 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 | | |  |
| 8 |
| 2,3 | Reaction of metals with acids. | 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 | Uses of metals. | State uses of some metals and alloys. | | Q/A & brief discussion;  Uses of Sodium, Aluminium, Zinc, Iron and Copper & some alloys. | |  | | K.L.B. BK IV  Pages 194-7 | | |  |
| 5 | Environmental effects of extraction of metals. | Identify some environmental effects of extraction of metals. | | Oral questions and open discussion.  Assignment / Topic review. | |  | | K.L.B. BK IV  Pages 197-8 | | |  |
| 9 | 1 | ORGANIC CHEMISTRY II **(ALKANES & ALKANOIC ACIDS)**  Alkanols (Alcohols). | 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. | |  | | K.L.B. BK IV  Page 205 | | |  |
| 2 | Nomenclature of alkanols. | Name and draw the structure of simple alkanols. | | Guided discovery of naming system for alkanols.  Draw and name structures of alkanols. | |  | | K.L.B. BK IV  Pages 206-8 | | |  |
| 3 | Isomerism in alkanols. | 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. | |  | | K.L.B. BK IV  Pages 208-10 | | |  |
| 4-5 | Preparation of ethanol in the lab. | 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 | | |  |
| 10 | 1 | Physical properties of alkanols. | | Explain the physical properties of alkanols***.*** | | Comparative evaluation of physical properties of alkanols.  Q/A & discussion on variation in physical properties of alkanols. | |  | | K.L.B. BK IV  Page 212 |  | |
| 2 | Chemical properties of alkanols. | | Describe some chemical reactions of alkanols. | | Group experiments/ teacher demonstration to investigate combustion of ethanol and its reaction with metals.  Write corresponding chemical equations. | |  | | K.L.B. BK IV  Pages 213-5 |  | |

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|  | 3 | | Esters and esterification. | | | Explain formation of esters.  Describe the esterification process. | | Teacher exposes and explains new concepts.  Assignment. | |  | K.L.B. BK IV  Pages 215-6 | | |  |
| 4,5 | | Oxidation of ethanol.Uses of alkanols. | | | Explain oxidation of ethanol by an oxidizing agent.  State uses of alkanols.  Explain the effects of alcohol on human health | | Q/A: review redox reactions, oxidizing and reducing agents.  Brief discussion: oxidation of ethanol using potassium (VII) manganate or potassium (VI) dichromate.  Write corresponding chemical equations.  Open discussion. | |  | K.L.B. BK IV  Pages 216-8 | | |  |
| 11 | | 1 | | Alkanoic (Carboxylic Acids). | | | Identify the functional group of alkanoic (carboxylic) acids.  Explain formation of alkanoic acid molecule. | | Q/A: review functional group of alkanols.  Brief discussion. |  | | K.L.B. BK IV  Page 219 |  | |
| 2 | | | Nomenclature of alkanoic acids. | | Name and draw the structure of simple alkanoic acids. | | Guided discovery of the naming system for alkanoic acids. |  | | K.L.B. BK IV  Pages 219-221 |  | |
| 3 | | | Lab preparation of ethanoic acid. | | Describe laboratory preparation of ethanoic acid. | | Teacher demonstration: prepare ethanoic acid in the lab.  Brief discussion on preparation of ethanoic acid. |  | | K.L.B. BK IV  Pages 221-223 |  | |
| 4,5 | | | Physical properties of alkanoic acids. | | Explain some physical properties of alkanoic acids. | | Compare physical properties of some alkanoic acids.  Discuss the difference in physical properties among alkanoic acids. |  | | K.L.B. BK IV  Pages 223-4 |  | |