**EMERALD ROYAL INTERNATIONAL SCHOOL, MPAPE ABUJA**

**LESSON PLAN AND NOTE FOR WEEK 2 ENDING 22ND SEPTEMBER, 2023**

**TERM: FIRST**

**WEEK : 2**

**DATE: 18TH - 22ND SEPTEMBER, 2023**

**SUBJECT : CHEMISTRY**

**TOPIC : PERIODIC TABLE**

**SUB- TOPIC : 1. characteristics of groups of elements.**

1. **Transition elements.**

**3. lanthanides and Actinides.**

**PERIOD: 1ST**

**TIME : 8: 10 - 8 :50**

**DURATION: 40 minutes**

**CLASS: SS2**

**NUMBER IN CLASS:**  3

**AVERAGE AGE: 15 years**

**SEX: mixed**

**LEARNING OBJECTIVES: By the end of the lesson, the students should be able to;**

1. State the characteristics of groups of elements.
2. State the characteristics of groups of elements.
3. State the characteristics of the lanthanides and Actinides.

**RATIONALE:**

**PREVIOUS KNOWLEGDE:** The student can state groups of elements.

**INSTRUCTIONAL MATERIALS:** A chart showing the periodic table.

**REFERENCE MATERIALS:** New school Chemistry for Senior Secondary Schools by Osei Yaw Ababio .

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| **STAGES/STEPS** | **TEACHER’S ACTIVITIES** | **STUDENTS’ ACTIVITIES** | **LEARNING POINTS** |
| **INTRODUCTION** | The teacher introduces the lesson by reviewing the previous lesson. | The students were active. | To arouse the students interest. |
| **PRESENTATION**  **STEP 1** | The teacher states the group of elements and their characteristics. | The students pay attention. | To keep them focus for better understanding. |
| **STEP 2** | The teacher asks the students to state the characteristics of the transition elements. | The students state the characteristics of the transition elements. | To encourage critical thinking. |
| **STEP 3** | The teacher states the characteristics of the lanthanides and Actinides. | The students pay attention. | To keep them focus for better understanding. |
| **BOARD SUMMARY** | **Properties and Characteristics of Each**  **Group**  1. ALKALI METALS: These elements are found in  group 1 of the periodic table, except hydrogen.  Examples include sodium, potassium etc.  **Characteristics of the elements**  -they ionize by loss of one electron i.e. they are  univalent  -they are highly reactive, reacting with oxygen from  air to form the corresponding oxide. 4Na(S) + O2(g)  2Na2O (S)  -their oxides are alkaline in nature, reacting with  water to form the corresponding hydroxides. E.g.  Na2O + H2O 2NaOH  -they are good reducing agents, reducing properties  increase down the group and decreases across the  period.  - they react vigorously with cold water to liberate  hydrogen and form alkalis.  2K(s) +2H2O(l) 2KOH(s)+ H2(g)  -their trioxonitrate v salts decompose on heating to  liberate oxygen and dioxonitrate iii salt.  2NaNO3(s) heat 2NaNO2(s) + O2(g)  2KNO3(s) heat 2KNO2(s) +  O2(g)  2. ALKALINE EARTH METALS: These elements  are found in group 2 of the periodic table. Examples  include beryllium, magnesium, calcium etc.  **Characteristics of the Alkali Earth Metals**  - They ionize by loss of two electrons i.e. they  are divalent  - They show varying degree of reactivity with  water. E.g. calcium reacts slowly with cold  water to form calcium hydroxide while  magnesium only reacts with steam to form  magnesium oxide liberating hydrogen in each  case.  Ca(s) +2H2O(l) Ca(OH)2(s) + H2(g)  Mg(s) + H2O(g) MgO(s) + H2(g)  NOTE: Ca(OH)2 is sparingly soluble in  water while MgO is completely insoluble in  water.  - Their trioxonitrate v salts decompose readily on  heating to give the oxides, oxygen and the  brown gas, nitrogen iv oxide.  2Ca(NO3)2 (s) heat 2CaO(s) +  4NO2(g) + O2(g)  2Mg(NO3)2 (s) heat 2MgO(s) +  4NO2(g) + O2(g)  - Their trioxocarbonate (IV) decompose on  heating to give the metallic oxide and carbon  (IV) oxide.  CaCO3(s) heat CaO(s) + CO2(g)  MgCO3(s) heat MgO(s) + CO2(g)  3. GROUP 3 ELEMENTS: these elements are found  in group 3 of the periodic table .e.g. aluminum (Al),  boron (B) etc.  **Characteristics of the elements**  - They are trivalent  - They form electrovalent compounds  - They are reducing agents  - Both the oxides and hydroxides are amphoteric  i.e. they have both basic and acidic properties  e.g. Al2O3 and Al(OH)3  Al2O3(s) + 3H2SO3(aq) Al2(SO3)3(aq) + 3H2O(l)  Alkali acid  Al2O3(s) + 2NaOH(aq)+ 3H2O(l) 2NaAl(OH)4 (aq)  Acid alkali  2Al(OH)3(s) + 3H2SO3(aq) Al2(SO3)3(aq) +  6H2O(l)  Alkali acid  Al(OH)3(s)+ NaOH(aq) + 3H2O(l) 2NaAl(OH)4  (aq}  acid alkali  - Aluminum trioxonitrate v decomposes to give  the metallic oxide, oxygen and nitrogen iv  oxide.  4Al(NO3)3 heat 2Al2O3(s) + 12NO2(g) +  3O2(g)  GROUP 4 ELEMENTS: These elements are found in group  4 of the periodic table e.g. carbon (C), silicon (S),  germanium (Ge ), tin(Sn) and lead (Pb).  **Characteristics of group 4 elements**  - They are tetravalent i.e. each of their atoms has four  valence electrons.  - The properties of the elements change from non  metallic to metallic on going down the group. For  example carbon is a non-metal; silicon and germanium  are metalloid while tin and lead are metals.  - They readily form covalent compounds  - The compounds of group 4 elements show oxidation  states of +2 and +4, with the stability of the +2  oxidation state increasing down the group, and the  oxidation state of the +4 decreasing down the group.  -  Silicon and tin react with steam at red heat to form the  +4 state oxide and hydrogen; however, carbon does not  react with water in any form.  -  Carbon and silicon form more +4 stable state  compounds while lead and tin form more +2 stable state  compounds.  Si (s) + 2H2O(g) SiO2(s) + 2H2(g)  -  Carbon, tin and silicon form +4 state oxides  when heated strongly in oxygen or air while  lead forms +2 oxide state instead.  C(s) + O2(g) CO2(g)  Si(s) + O2(g) SiO2(s)  Sn(s) + O2(g) SnO2(s)  Pb(s) + O2(g) PbO(s)  GROUP 6 ELEMENTS: The elements in this group  include oxygen, sulphur etc.  Characteristics  - they are non-metals  - they are electron acceptors consequently they  are oxidizing agents  - Oxygen is slightly soluble in water while  sulphur is insoluble in water.  - Oxygen and sulphur combine directly with  hydrogen to give water and hydrogen sulphide  respectively.  2H2(s) + O2 2H2O(l)  2H2(g) + S(s) H2S(s)  i.  GROUP 7 ELEMENTS: They are called the  HALOGENS. Halogens mean salt formers.  Examples are fluorine, chlorine, bromine,  iodine, etc.  Characteristics of the halogens  - They are the most reactive non-metals, so  reactive that they exist mainly as salt rather  than as free elements.  - They exist as diatomic molecules  - They are coloured  - They ionize to form univalent negative ions  - They form electrovalent compound when  combined with metal.  - Their hydrides are covalent gases at room  temperature, and dissolve in water to form  acids.  - The halogens show a progressive change in  colour towards being darker—fluorine is  yellow; chlorine is greenish yellow; bromine is  reddish brown; and iodine is black.  THE NOBLE GASES: These elements are  called noble gases because their outermost shell  is complete; hence they are unreactive at room  temperature and pressure. They are also called  Inert Gases because they are unreactive.  ii.  TRANSITION ELEMENTS: These elements  are found between group 2 and 3 of the periodic  table. Examples include vanadium, scandium,  titanium, chromium, manganese, cobalt etc.  **Characteristics of Transition Elements**  - They are all metals  - They show variable oxidation states  - They have high melting and boiling points  - They are used as catalyst  **LANTHANIDES AND ACTINIDES:** The  lanthanides are found in period 6 while the actinides  are found in period 7 of the periodic table. It begins  from lanthanum (La) and ends with lutetium (Lu).  The actinides, on the other hand, are the artificial  elements.  **Summary of Periodic Trends**  1. Melting/ boiling points of metallic elements  increase due to increase in strength of the metallic  bond while melting/boiling points of non-metallic  378 elements decrease due to decrease in Van der  Waals’ forces of attraction.  2. Ionization energy increases due to increase in  proton number or increase nuclear charge or  decreased atomic radius.  3. Electron affinity increases due to decrease of atomic  radius or increase in nuclear charge  4. Electronegativity of elements increases due to  increase in nuclear charge or decrease in radius  5.Electropositivity of elements decreases to increase  in nuclear charge  6. Atomic/ionic radius decreases due to increase in  7. Nuclear charge or increase in proton number or  increase in effective nuclear charge.  8. Metallic and thermal characters decrease due to  increase in covalent character. | The students ask question for clarification. | To create room for slow learners. |
| **EVALUATION** | The teacher evaluates the students with the following questions;   1. State 2 characteristics each of the following groups; 2. Group 1 elements 3. Group 2 elements. 4. Group 7 elements. 5. Noble gases. 6. Transition elements. | The students attempt the questions. | To ascertain their level of understanding. |
| **CONCLUSION** | The teacher concludes by copying note on the board. | The students copy the note into their note books. | For future use. |
| **HOME WORK** | State 3 exaples each of elements in the following groups;   1. Group 1 2. Group 2 3. Group 3 4. Group 4 5. Group 5 6. Group 6 7. Group 7 8. Noble gases. 9. Transition elements. | The students did their assignment and submit for marking and correction. | To encourage the students to study at home. |

**22nd September, 2023**

**DEPUTY HEAD INSTRUCTOR ADMIN**

**NB: Approved!**