Candidate's Index Number
Signature: .

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
SCHOOL OF EDUCATIONAL DEVELOPMENT AND OUTREACH
INSTITUTE OF EDUCATION

COLLEGES OF EDUCATION
FOUR-YEAR BACHELOR OF EDUCATION (B.ED)
THIRD YEAR, END-OF-FIRST SEMESTER EXAMINATION, AUGUST 2023

21ST AUGUST 2023   GENERAL CHEMISTRY THEORY III   2:00 PM – 2:30 PM

This paper consists of two sections, A and B. Answer ALL the questions in Section A and TWO questions from Section B. Section A will be collected after the first 30 minutes.

SECTION A
(20 MARKS)

Answer ALL the questions in this Section.

Items 1 to 20 are stems followed by four options lettered A to D. Read each item carefully and circle the letter of the correct or best option.

1. What is the immediate reaction of monomers in the formation of a polymer?
    A. Condensation reaction between monomers.
    B. Conversion of monomer-to-monomer ions by protons.
    C. Coordinate reaction between monomers.
    D. Hydrolysis of monomers.

2. In what form does the impure gold used as anode during electrolytic extraction of gold deposited on the cathode?
    A. Darkened metal.
    B. Hard gold.
    C. Pure gold.
    D. Very reactive gold.

3. Which of the following statements is true about the reaction represented by the equation?
    $6 \ I^- + 2 \ MnO_4^- + 4 \ H_2O_{(l)} \longrightarrow 3 \ I_{(s)} + 2 \ MnO^-_{(s)} + OH^-$
    A. Iodide ion is oxidized by hydroxide ion.
    B. MnO_4^- is oxidized by iodide ion.
    C. The oxidation number of iodine changes from -1 to 0.
    D. The oxidation number of manganese changes from +7 to +2.

4. Which of the following factors influences the choice of method for the extraction of a metal from its ore?
   A. Abundance
   B. Ductility
   C. Electropositivity
   D. Expensive

5. What is the maximum number of electrons that can be accommodated in the K-shell? .... electrons.
   A. 2
   B. 8
   C. 18
   D. 32

6. The two monomers for the synthesis of Nylon 6,6 are ....
   A. $HOOC(CH_2)_4COOH$ and $H_2N(CH_2)_4NH_2$
   B. $HOOC(CH_2)_4COOH$ and $H_2N(CH_2)_6NH_2$
   C. $HOOC(CH_2)_6COOH$ and $H_2N(CH_2)_4NH_2$
   D. $HOOC(CH_2)_6COOH$ and $H_2N(CH_2)_6NH_2$

7. Which oxidation states of phosphorus can be found in the disproportionation reaction; $P_2H_4 \rightarrow PH_3 + P_4H_2$
   A. P^{2-}
   B. P_2^{4-}
   C. P^{3+}
   D. P_4^{2+}

8. Which of the following elements can be used for cathodic protection?
   A. Al
   B. Cd
   C. Cu
   D. Na

9. Which of the following processes is used to recover gold and silver after their ores have been leached with cyanide ions?
   A. Calcination followed by roasting.
   B. Displacement of metal by some other metal from the complex ion.
   C. Roasting of the metal complex.
   D. Thermal decomposition of the metal complex.

10. Which of these formations account for brown appearance of roofing sheet?
    A. $Fe(OH)_3$
    B. Fe_2O_3
    C. $Fe_2O_3.XH_2O$
    D. $FeO.XH_2O$

11. What is the name of the first procedure in the purification of bauxite? .... process.
    A. Bayer
    B. Electrolysis
    C. Haber
    D. Permutit

12. Which of these reagents is used to test for the presence of protein in egg albumen?
    A. Benedict's solution
    B. Bromine water
    C. Iodine solution
    D. Ninhydrin

13. In which block of the periodic table does the element with atomic number 29 belongs to?
    A. d – Block
    B. f – Block
    C. p – Block
    D. s – Block

14. Which of the following is usually referred to as 'flint glass'? .... glass.
    A. Crystal
    B. Hard
    C. Soda
    D. Soft

15. What is the final product formed when limestone and clay are crushed together, mixed with water and heated?
    A. Cement
    B. Silica
    C. Silicates
    D. Silicones

16. Which polymer is used in the manufacture of paints and lacquers?
    A. Bakelite
    B. Glyptal
    C. Poly vinyl chloride
    D. Polypropene

17. Iron can be extracted from all of the following **except** ....
    A. aluminium oxide.
    B. heamatite.
    C. limonite.
    D. magnetite.

18. *Assertion (A)*:   Among halogens, fluorine is the **best** oxidant.
    Reason (R):   Fluorine is the most electronegative atom.

    A. A is true but R is false.
    B. Both A and R are false.
    C. Both A and R are true and R is the correct explanation of A.
    D. Both A and R are true but R is not the correct explanation of A.

19. *Assertion (A)*:   In the reaction between potassium permanganate and potassium iodide, permanganate ions act as oxidising agent.
    Reason (R) :   Oxidation state of manganese changes from +2 to +7 during the reaction.

    A. A is true but R is false.
    B. Both A and R are false.
    C. Both A and R are true and R is the correct explanation of A.
    D. Both A and R are true but R is not the correct explanation of A.

20. Which of the following processes yields smaller, more highly branched alkanes during petroleum refining? .... cracking.
    A. Atomic
    B. Catalytic
    C. Thermal
    D. Thermonuclear

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SECTION B
(40 MARKS)

Answer any TWO questions in this Section.

1.
   a. Balance the following equation by the ion-electron method

      $Zn\ (s) + NO_3^- \longrightarrow Zn^{2+}\ (aq) + NH_4\ (aq) + H_2O$ (In acid solution)   **[10 marks]**

   b. How would you know whether a redox reaction is taking place in the following media?
      i. an acidic medium   **[2 marks]**
      ii. alkaline medium   **[2 marks]**
      iii. neutral medium   **[2 marks]**

   c. Write the composition of the following alloys:
      i. brass   **[2 marks]**
      ii. steel   **[2 marks]**

2.
   a. The atomic number of an element is 11. Predict the following:
      i. the number of valence electrons in its atom   **[2 marks]**
      ii. its valency   **[2 marks]**
      iii. its group number   **[2 marks]**
      iv. whether it is a metal or a non-metal   **[2 marks]**

b. Calculate the oxidation number of underlined or **bolded** elements in the followings:
   i. $Na_2B_4O_7$ [2marks]
   ii. $H_4P_2O_7$ [2marks]
   iii. CaO_2 [2 marks]
   iv. $NaBH_4$ [2 marks]
   v. $H_2S_2O_7$ [2 marks]

c. Steel is an example of an alloy, what are the composition of steel.   [2 marks]

3.

a. Which gas is formed when coal is heated in the absence of air?   [3 marks]

b. Explain the following in relation to petroleum Chemistry:
   i. Cracking   [2 marks]
   ii. Octane number   [2 marks]

c. Mention **three** effects of oil spillage on the environment.   [3 marks]

d. Balance this redox reaction in basic medium:

$$Br^- + MnO_4^- \longrightarrow MnO_2 + BrO_3^-$$ [10 marks]

4.

a. State the composition of Portland cement.   [4 marks]

b. Balance this redox equation in basic medium:

$$AlH_4^- + H_2CO \longrightarrow Al^{3+} + CH_3OH$$ [10 marks]

c. Mention the **four** classes of Biotechnology.   [4 marks]

d. Brass is an example of an alloy, state the composition of brass.   [2 marks]