JULY 2021
EBS 115
GENERAL CHEMISTRY THEORY I
2 HOURS

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)
FIRST YEAR, END-OF-SECOND SEMESTER EXAMINATION, JULY 2021

JULY 30, 2021 GENERAL CHEMISTRY THEORY I 2:00 PM – 2:40 PM

This paper consists of two sections, A and B. Answer ALL the questions in Sections A and THREE questions from Section B. Section A will be collected after the first 40 minutes.

SECTION A
(40 Marks)

Answer ALL the questions in this Section.

For items 1 to 20, each stem is followed by four options lettered A to D. Read each item carefully and circle the letter of the correct or best option.

1. An organic compound A contains 48% carbon, 8.1% hydrogen and the remaining oxygen. The vapour density of A is 37. Determine the relative molecular mass of A.
   A. 28.5
   B. 31.0
   C. 43.9
   D. 74.0

2. Which of the following are true about orbitals? They .....
   A. are located in the nucleus.
   B. have different shapes.
   C. have the same energy.
   D. have the same size.

3. The bond in LiI has more covalent character than that in NaI because .....
   A. electrons are shared in forming the bonds in LiI.
   B. Li^+ ion is larger than that of Na^+ ion.
   C. the charge density of Na^+ ion is greater than that of Li^+ ion.
   D. the polarizing power of Li^+ ion is greater than that of Na^+ ion.

4. Calculate the mass of Na_2CO_4 required to prepare 500mL of 0.25M solution. [Na_2CO_4=106].
   A. 13.250g
   B. 13250g
   C. 132.50g
   D. 1.3250g

5. Arrange the following according to increasing acidity:

   (I) HClO (II) $HClO_3$ (III) $HClO_2$ (IV) $HClO_4$

   A. (I), (III), (II). (IV)
   B. (I), (II), (III), (IV)
   C. (IV), (II), (III), (I)
   D. (IV), (III), (II), (I)

6. Calculate the number of atoms present in 5g of carbon [C = 12].
   A. 14.46×10^{-23} atoms.
   B. 14.46×10^{23} atoms.
   C. 2.509×10^{23} atoms.
   D. 2.509×10^{-23} atoms.

7. Which of the following groups of the periodic table form covalent compounds with each other or with hydrogen?
   A. Group 1 and group 7.
   B. Group 2 and group 7.
   C. Group 3 and group 4.
   D. Group 6 and group 7.

8. Which of the following compounds is neutral to moist litmus paper?
   A. CO_2
   B. KCl
   C. NO_2
   D. SO_3

9. Acids react with metal oxides to form .....
   A. salt and hydrogen gas.
   B. salt and oxygen gas.
   C. water and oxygen gas.
   D. water and salt.

10. Covalent compounds generally have relatively low melting points because they .....
   A. are non-polar compounds.
   B. are organic compounds.
   C. are volatile liquids.
   D. possess weak intermolecular forces.

11. The number of peaks in the mass spectrum of an element can be used to determine the .....
   A. atomic mass of the element.
   B. atomic number of the element.
   C. number of isotopes the element has.
   D. number of molecules the element can form.

12. Which of the following can conduct electricity?
    A. Aqueous NaCl
    B. Ethanol
    C. Liquid HCL
    D. Solid NaCl

13. What is the hybridized state of nitrogen in ammonia?
    A. sp
    B. sp^3
    C. sp^2
    D. sp^3d^2

14. Which of the following pairs of molecules both form hydrogen bonds?
    A. C_2H_5OH and CH_3CH_3
    B. CH_3OH and H_2
    C. H_2S and CH_4
    D. NH_3 and H_2O

15. Which of the following is a Lewis acid?
    A. Br^-
    B. Cl_2
    C. O
    D. Zn^+

16. The possible values of spin quantum number are.....
    A. -1...0 ...+1
    B. 0 to n-1
    C. 0,1,2,3....
    D. +1/2 and -1/2

17. Identify the base that will conduct electricity strongly among the following bases.
    A. $Cu(OH)_2$
    B. CuO
    C. Li_2O
    D. $Zn(OH)_2$

18. Carbon is said to be (a/ an) ..... because it has a room for four bonds to be formed covalently.
    A. hydrocarbon
    B. isomer
    C. saturated
    D. tetravalent

19. The electronic configuration of $_{11}Na$ is given as: $1s^2\ 2s^2\ 2p^6\ 3s^1$. What is the name of its valence shell?
    A. K-shell
    B. L-shell
    C. M-shell
    D. N-shell

20. An example of sp^3d^1 is .....
    A. ethyne.
    B. methane.
    C. phosphorus pentachloride.
    D. sulphur hexafluoride.

Items 21 to 30 are statements followed by True and False options. Read each statement carefully and indicate whether it is True or False by circling the letter of the correct option.

21. One of the limitations of Bronsted-Lory concepts of acids and bases is that: *all acid-base reactions are considered as reversible.*
    A. True
    B. False

22. Acids have higher pOH values than bases.
    A. True
    B. False

23. The negatively charged fundamental particle present in an atom with negligible mass is called proton.
    A. True
    B. False

24. The mixing up of an s-, three p- and two d-orbital of an atom to produce five equal-energy orbitals is called sp^3d^2 hybrid orbitals.
    A. True
    B. False

25. Molar mass is mass in grams of 1 mole of a substance.
    A. True
    B. False

26. In a solution, the solutes are always solids.
    A. True
    B. False

27. The rule/principle that governed the filling of degenerate orbital is ascribed to Aufbau Principle.
    A. True
    B. False

28. According to Lewis concept of acids, all cations are acids.
    A. True
    B. False

29. A good buffer can be formed between Na_2CO_3 and H_2CO_3.
    A. True
    B. False

30. The pH of 0.025MHCl is 2.6.
    A. True
    B. False

For items 31 to 40, write the appropriate responses in the spaces provided.

31. The shape of CO_2 is linear which means that its bond angle is .....

32. The weighted average of the masses for all the isotopes of certain element is known as .....
    .....

33. The polarity of a molecule is determined by measuring the .....

34. The shape of sp^3d^2 orbitals is .....

35. The relative atomic mass of element is the average mass of naturally occurring isotopes of the element relative to the mass of .....

36. Relative ..... is used for ionic compounds instead of relative molecular mass.

37. A covalent bond between atoms of identical electronegativity is known as
    .....

38. What is the IUPAC name of Zn^{2+}? .....

39. What formula will be used to determine the concentration of OH^- present in a solution if the pH value is given? .....

40. A solution in which water is the solvent is called .....