FIRST YEAR HIGHER SECONDARY
MODEL EXAMINATION, FEBRUARY 2020

Part – III   Time : 2 Hours

CHEMISTRY   Cool-off time : 15 Minutes

Maximum : 60 Scores

General Instructions to Candidates :

- There is a 'Cool-off time' of 15 minutes in addition to the writing time.
- Use the 'Cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- Read the instructions carefully.
- Calculations, figures and graphs should be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.

- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.

- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.

- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവ്വം വായിക്കണം.

- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.

- ചോദ്യങ്ങൾ മലയാളത്തിലും നല്ലിയിട്ടുണ്ട്.

- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.

- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

Answer any 7 questions from 1-9. Each carries 1 score.   (ˉ × 1 = 7)

1. In hydrogen spectrum, the series of lines appearing in Ultra violet region are called
    _____

    (a) Balmer line   (b) Lyman line
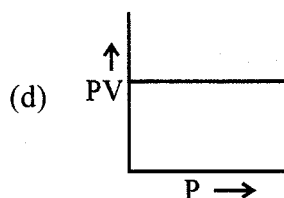   (c) Pfund line   (d) Bracket line

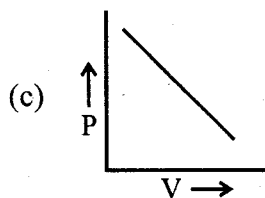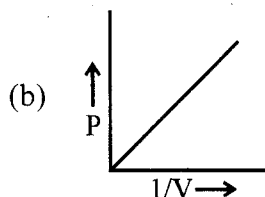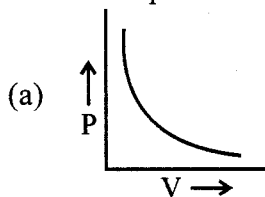2. Conjugate base of a strong acid is _____
    (a) a weak base   (b) a strong base
    (c) Neutral   (d) a weak acid

3. Which of the elements show least value of ionization energies in each periods ?
    (a) Alkaline earth metals   (b) Alkali metals
    (c) Noble Gases   (d) Halogens

4. Which Graph does not represent Boyle's law ?

5. Which one of the following is a common component of photochemical smog ?
    (a) O_3 (b) CO
    (c) CO_2 (d) CH_4

6. Boric acid is polymeric due to
    (a) Its acidic nature   (b) The presence of H bond
    (c) Its monobasic nature   (d) Geometry

7. In _____ reaction an element in one oxidation state is simultaneously oxidized and reduced.

8. Delocalization of electrons involving σ bond is known as _____.

9. The hydrocarbon which give benzene when passing through a red hot iron tube is
    _____.

Answer any 10 questions from 10-22. Each carries 2 scores.   (10 × 2 = 20)

10. Development of periodic table have made the study of elements and their compounds easier.

    (a) State the modern periodic law.   1

    (b) What would be the IUPAC name of the element with atomic number 114.   1

11. Irrespective of the source, pure sample of CO_2 always yields 27.27% mass of carbon and 72.72% mass of oxygen.

    (a) Which law is illustrated here ?   1

    (b) State the law.   1

12. Give reason for the following :

    (a) The first ionization enthalpy of oxygen is smaller compared to nitrogen.   1

    (b) Electron gain enthalpy of F is less than that of Cl.   1

13. Density of a gas at 27 °C and 1 atm is 256 g/L. Calculate its molar mass IR = 0.0821 L atm mol^{-1} k^{-1}]   2

14. Classify the following properties into extensive and intensive.

    (Density, Enthalpy, Specific heat capacity, Entropy)   2

15. (a) The water solutions of the ionic compounds KCl, CH_3COOK and NH_4Cl show different pH value. Identify the acidic, basic and neutral solution among these.   1

    (b) What is ionic product of water ?   1

16. H_2O_2 is an important chemical.

    (a) Give a method to prepare H_2O_2.   1

    (b) Represent the structure of H_2O_2.   1

17. Lithium shows a diagonal relationship with magnesium.

    Give any two similarity between Li and Mg.   2

18. Calculate the wave number radiation due to transition of an electron from 4th to 2nd orbit (R_H = 109677 cm^{-1})

2

19. Draw the Newman's projection of the eclipsed and staggered conformation of ethane.

2

20. Diborane is an electron deficient compound.

    (a) Name the special bonds that present in diborane.

1

    (b) How will you convert diborane into inorganic benzene ?

1

21. What happen when

    (a) Borax is heated strongly.

1

    (b) Boric acid is added to water.

1

22. Give the structure of the following compound :

    (a) 4-Chloro-2-Methyl Pentane.

1

    (b) 4-hydroxy pentan-1-oic acid.

1

Answer any 7 questions from 23-31. Each carries 3 scores. (7 × 3 = 21)

23. (a) What is atomic mass unit (amu) ?

1

    (b) $KClO_3$ on heating decomposes to KCl and O_2. Calculate the mass of O_2 produced by heating 50 gm $KClO_3$.

    (Hint. 2 $KClO_3$ → 2KCl + 3O_2)

2

24. (a) Classify the following molecule according to the type of hydrogen bond H_2O, O-nitrophenol.

1

    (b) NF_3 and NH_3 show dipole moment. But the dipole moment of NF_3 is less than that of NH_3. Why ?

2

25. (a) Give Vander Waal's equation for 'n' mole of a gas.

1

    (b) Write four postulates of kinetic theory of gases.

2

26. (a) Give the criteria for spontaneity of a process in terms of free energy change (ΔG).   **1**

     (b) How it is related to the enthalpy and entropy of a system ?   **1**

     (c) What happens to the entropy during the following changes ?

         (i) A liquid crystallises into a solid.

         (ii) $CaCO_{3(s)} \xrightarrow{\Delta} CaO_{(s)} + CO_{2(g)}$ **1**

27. (a) Using stock notation represent the following compounds :

         (i) SnO_2 (ii) Cr_2O_3 **1**

     (b) In the reaction

         $2Cu_2O_{(s)} + 2Cu_2S_{(s)} \rightarrow 6Cu_{(s)} + SO_2$

         Identify the following :

         (i) Substance oxidized

         (ii) Substance reduced

         (iii) Oxidizing agent

         (iv) Reducing agent   **2**

28. (a) Write the name of any one salt responsible for the permanent hardness of water.   **1**

     (b) Explain one chemical method for removing permanent hardness of water.   **1**

     (c) Suggest a disadvantage of hard water.   **1**

29. (a) What is plaster of paris ?   **1**

     (b) Write the chemical equation showing the preparation of plaster of Paris from Gypsum.   **1**

     (c) What is dead burnt plaster ?   **1**

30. (a) Consider the reaction given below :

         $CH_3 - CH = CH_2 + HBr \xrightarrow{\text{Peroxide}} X.$

         (i) Identify the product X.   **1**

         (ii) Name the reaction.   **1**

     (b) Complete the following reaction :

         $CaC_2 + 2H_2O \rightarrow$ ----- $+ Ca(OH)_2.$ **1**

31. (a) Acid rain causes extensive damage to aquatic life.

    (i) What do you mean by acid rain ?   **1**

    (ii) Name the chemical responsible for acid rain.   **1**

    (b) Which gases are responsible for green house effect ?   **1**

Answer any 3 questions from 32-35. Each carries 4 scores.   **(3 × 4 = 12)**

32. (a) State and explain Hund's rule of maximum multiplicity with one example.   **2**

    (b) State Heisenberg's uncertainty principle.   **1**

    (c) Quantum number gives the address of electron. Write the quantum number which determine

    (i) Distance of electron from nucleus.

    (ii) The orbital angular momentum.   **1**

33. Based on bond order compare the relative stability of O_2 and O_2^{2-}.   **4**

34. Common ion effect is a phenomenon based on the Le-Chatelier's principle.

    (a) Illustrate common ion effect using suitable example.   **2**

    (b) Explain : (i) Buffer solution.

               (ii) Solubility product.   **2**

35. (a) Briefly explain the principle involved in Dumas method for the estimation of nitrogen.   **2**

    (b) Carbocations are formed by the heterolytic cleavage of a co-valent bond.

    (i) What is heterolytic bond fission ?   **1**

    (ii) Arrange the following carbocations in the increasing order of stability.

    $(CH_3)_2 CH\oplus, CH_3 - CH_2\oplus, (CH_3)_3 C\oplus, \oplus CH_3$ **1**