

BUDHA DAL PUBLIC SCHOOL, PATIALA
Final Examination (26 February 2026)

Class XI (Science)
Subject - Chemistry
(Set - A)

Time: 3hrs.

M.M. 70

General Instructions:

1. There are 33 questions in this question paper with internal choice.
2. Section A consists of 16 multiple-choice questions carrying 1 mark each.
3. Section B consists of 5 short answer questions carrying 2 marks each.
4. Section C consists of 7 short answer questions carrying 3 marks each.
5. Section D consists of 2 case-based questions carrying 4 marks each.
6. Section E consists of 3 long answer questions carrying 5 marks each.
7. All questions are compulsory.
8. Use of log tables and calculators is not allowed.

Section - A

- Q1. Which of the following is dependent on temperature?
a) Molarity b) Molality c) Mole fraction d) Mass percentage
- Q2. Two electrons occupying the same orbital are distinguished by
a) Magnetic quantum number b) Azimuthal quantum number
c) Spin quantum number d) Principal quantum number
- Q3. Consider the isoelectronic species Na^+ , Mg^{+2} , F^- and O^{-2} . The correct order of increasing length of their radii is
a) $F^- < O^{-2} < Mg^{+2} < Na^+$ b) $Mg^{+2} < Na^+ < F^- < O^{-2}$
c) $O^{-2} < F^- < Na^+ < Mg^{+2}$ d) $O^{-2} < F^- < Mg^{+2} < Na^+$
- Q4. Which of the following compounds has zero dipole moment?
a) CCl_4 b) $CHCl_3$ c) HF d) NH_3
- Q5. For a reaction $H_2 + I_2 \rightleftharpoons 2HI$ the K_p and K_c are related as ?
a) $K_p = K_c (RT)^2$ b) $K_p = K_c (RT)^0$ c) $K_p = K_c (RT)^{-2}$ d) $K_p = K_c (RT)^{-1}$
- Q6. Calculate the oxidation number of P in the HPO_3^{-2}
a) +2 b) +3 c) 2.5 d) 1.5
- Q7. The numbers of sigma (σ) and Pi (π) bonds in pent-2-en-4-yne is
a) 11 σ bonds and 2 π bonds b) 13 σ bonds and 2 π bonds
c) 10 σ bonds and 3 π bonds d) 8 σ bonds and 5 π bonds
- Q8. Which of the following statements is not correct for a Nucleophile?
a) Nucleophiles attack low electron density site
b) Nucleophiles are not electron seeking
c) Nucleophile is a Lewis acid
d) Ammonia is a nucleophile
- Q9. All bonds in benzene ring are equal due to
a) Tautomerism b) I - Effect c) Resonance d) Isomerism
- Q10. The enthalpies of all elements in their standard states will
a) Unity b) Zero c) <0 d) different for each element
- Q11. On hybridization of one S and two P orbital we get
a) Two mutually perpendicular orbitals
b) Two orbitals are 180°
c) Four orbitals directed tetrahedrally
d) Three orbitals in a plane

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Q12. The empirical formula and molecular mass of a compound and CH_2O are 180 respectively. What will be the molecular formula of the compound?

- a) $\text{C}_9\text{H}_{18}\text{O}_9$ b) CH_2O c) $\text{C}_6\text{H}_{12}\text{O}_6$ d) $\text{C}_2\text{H}_4\text{O}_2$

The questions (Q.No. 13 - 16) given below consist of Assertion and Reason. Use the following key of select the correct answer.

- a) Assertion and Reason both are correct and reason is correct explanation for assertion.
 b) Assertion and Reason both are correct but reason is not correct explanation for assertion.
 c) Assertion is correct but Reason is incorrect.
 d) Assertion is incorrect but Reason is correct.

Q13. Assertion : The ethyne molecule is linear in shape.

Reason : The hybrid state of both the carbon atoms in ethyne is sp^2 .

Q14. Assertion : Pent-1-ene and pent-2-ene are position isomer.

Reason : Position isomers differ in the position of functional group on a substituent.

Q15. Assertion : A solution of FeSO_4 can be stored in copper vessel.

Reason : E^0 of $\text{Cu} < E^0$ of Fe .

Q16. Assertion : For any chemical reaction at a particular temperature, the equilibrium constant is fixed and is a characteristic property.

Reason : Equilibrium constant is independent of temperature.

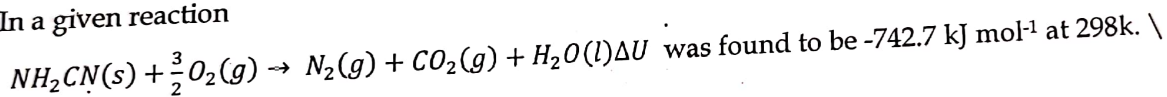
Section - B

Q17. a) How many significant figures are present in 500.0?

b) How many atoms are present in 52U of He?

Q18. An element P has atomic number $Z = 21$ and Q has atomic number $Z = 17$. Locate the position of these elements in terms of group and period.

Q19. In a given reaction

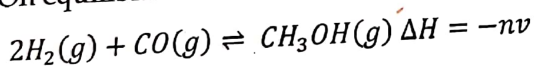


Calculate enthalpy change for the reaction at 298K.

Q20. Describe the effect of

- a) Addition of H_2 b) addition of CH_3OH c) Using catalyst d) increasing temperature

On equilibrium of the reaction



Q21. Draw structural formulae of

- a) 2 - Bromo - 4 chloropentanal b) 2 - methyl benzoic acid

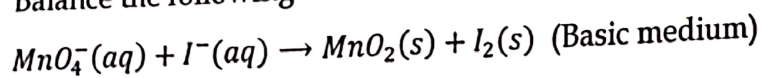
OR

What are electrophiles and nucleophiles? Explain with example.

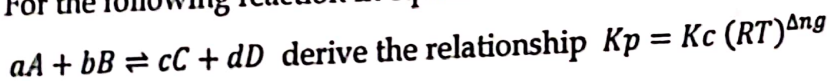
Section - C

22. An alkene 'A' on ozonolysis gives a mixture of ethanal and pent-3-one. Write the structure of A and IUPAC-name of A.

23. Balance the following redox reaction by Ion election method.



24. For the following reaction in equilibrium



Also state the condition when $K_p = K_c$

A-2



Q25. Define the following terms

- a) Extensive property with example
- b) Molar heat capacity
- c) Entropy of a system

Q26. 0.3780gm of organic compound gave 0.5740gm of silver chloride in Carius estimation. Calculate the percentage of chlorine present in the compound. (Given M.M of Ag = 108 U, Cl = 35.5 U)

Q27. Write Electronic configuration of

- a) Cu^{+1} ($z = 29$)
- b) If an electron in a 3d orbital, what are the possible value of l and m
- c) Why 3f orbital is not possible?

Q28. Define Dipole moment. What will be the net dipole moment of BF_3 and CCl_4 molecule?

OR

Draw M.O diagram of O_2 molecule. On the basis of this calculate Bond order and magnetic character of O_2 molecule.

Section - D

Q29. Read the following passage and answer the questions that follow:

Weak acids and weak bases ionize to a small extent in aqueous solution. Hence, an equilibrium is set up between the ions and the unionized acid or base. The equilibrium constant for such equilibria are called ionization constants or dissociation constants of the weak acid or weak base and represented by ' K_a ' or ' K_b '. The extent to which weak acid or a weak base dissociates is called its degree of dissociation and is represented by ' α '. Knowing degree of dissociation at a particular concentration of a weak acid or base, its ionization constant can be calculated or vice versa. Knowing the H^+ ion concentration or OH^- ion concentration from the values of K_a and C (molar concentration), pH of the solution can be calculated. Also if some salt of the weak acid with a strong base is present alongwith the weak acid, or salt of a weak base with strong acid alongwith the weak base, pH of the solution can be calculated.

Based on the above paragraph, answer the following questions:

- a) The concentration of $[\text{H}^+]$ in a sample of soft drink is 3.8×10^{-3} M. What is its pH? Given $\log 3.8 = 0.58$
- b) What will be Bronsted Bases of HF, H_2SO_4
- c) Define common ion effect with example.

OR

Define Buffer solution with its types.

Q30. Read the given passage and answer the questions that follow:

Chemical reactions are usually accompanied by the breaking of existing chemical bonds and the formation of new bonds. The breaking or cleavage of covalent bond occurs in two ways - Heterolytic cleavage and homolytic cleavage.

In heterolytic cleavage, there is 'unequal breaking' i.e. the electron pair is retained by one of the chemical species. After heterolysis, the species which has electron pair gains a negative charge and the other species possessing sextet of electrons acquires a positive charge. This positively charged species is known as 'Carbocation'. Some examples of carbocations are CH_3CH_2^+ , $(\text{CH}_3)_2\text{CH}^+$, $(\text{CH}_3)_3\text{C}^+$, etc. Alkyl groups directly attached to positively charged cation stabilise so the order of stability is

$\text{CH}_3 < \text{CH}_3\text{CH}_2 < (\text{CH}_3)_2\text{CH} < (\text{CH}_3)_3\text{C}$. Sometimes, the heterolytic cleavage is such that the carbon gets the shared pair of electrons and such a species is known as, carbanions. Both carbocations and carbanions are unstable and reactive species.

In homolytic cleavage, one of the electrons of the shared pair moves to each of the bonded atoms. Thus, neutral species containing an unpaired electron formed and are called free radicals. Alkyl radical stability increases as we proceed from primary to tertiary i.e. $\text{CH}_3 < \text{CH}_2\text{CH}_3 < \text{CH}(\text{CH}_3)_2 < (\text{CH}_3)_3$

A-3



- What is the correct order of decreasing stability of 3° , 2° and 1° carbocation?
- Write the correct representation involving a heterolytic fission of CH_3Br
- Identify the groups with $-I$ and $+I$ effect from the following
 $-\text{NO}_2, -\text{OCH}_3, \text{Cl}, \text{COOH}$

OR

(C) What is the free radical? Write increasing order of stability in O_2 free radicals.

Section - E

- Q31. (A) i) What is hybridization states of underlined atom. Also draw shape with bond angle
- $\underline{\text{N}}\text{H}_3$ b) $\underline{\text{P}}\text{Cl}_5$
 - Draw Lewis dot structure of CO_3^{2-} molecule

OR

- (B) i) Differentiate between σ and π bond .
- Draw Resonance structure of SO_3 molecule .
 - Define electro negativity
- Q32. (A) a) What is electro chemical cell? In Zn/Cu Electro chemical cell, which electrode you will select as
- Anode (ii) Cathode
- Write redox equation for above cell.
- b) Can EMF of cell be negative? If not give reason?

OR

- (B) a) Define Disproportionation reaction with example.
- What is role of salt bridge in E-cell?
 - What is standard electrode potential of Hydrogen Electrode?
- Q33. (A) a) What are necessary conditions for any system to be aromatic?
- b) Draw Cis and Trans isomer of But-2-ene which isomer will have higher boiling point and why?

OR

- (B) (a) Write (i) Wurtz Reaction (ii) Friedal Craft Alkylation Reaction
- (b) How you will being following conversion?
- Ethyne to Benzene
 - Phenol to Benzene
 - Propene to 2 - Bromo propane