

Class - XIITH
CHEMISTRY

MOCK EXAMS

Serial Number: 3

Time: 3 Hours

Maximum Marks: 70

Exam Date: _____



General Instructions:

Read the following instructions carefully and follow them:

- (i) This question paper contains 33 questions. All questions are compulsory.**
- (ii) Question paper is divided into five sections A, B, C, D and E.**
- (iii) Section A questions number 1 to 16 are multiple choice type questions. Each question carries 1 mark.**
- (iv) Section B questions number 17 to 21 are very short answer type questions. Each question carries 2 marks.**
- (v) Section C questions number 22 to 28 are short answer type questions. Each question carries 3 marks.**
- (vi) Section D questions number 29 and 30 are case-based questions. Each question carries 4 marks. Each question has subparts with internal choice in one of the subparts.**
- (vii) Section E questions number 31 to 33 are long answer type questions. Each question carries 5 marks.**
- (viii) There is no overall choice. However, an internal choice has been provided in Sections B, C and D of the question paper. A candidate has to write answer for only one of the alternatives in such questions.**
- (ix) Wherever necessary, neat and properly labelled diagrams should be drawn.**

सरदार पटेल
Academy & Research Centre

SECTION: A

Questions no. 1 to 16 are Multiple Choice Type Questions, carrying 1 mark each. (16X1=16)

1. Low concentration of oxygen in the blood and tissues of people living at high altitude is due to _____.

- (i) low temperature
- (ii) low atmospheric pressure
- (iii) high atmospheric pressure
- (iv) both low temperature and high atmospheric pressure

2. The difference between the electrode potentials of two electrodes when no current is drawn through the cell is called _____.

- (i) Cell potential
- (ii) Cell emf
- (iii) Potential difference
- (iv) Cell voltage

3. The CFSE for octahedral $[\text{CoCl}_6]^{4-}$ is $18,000 \text{ cm}^{-1}$. The CFSE for tetrahedral $[\text{CoCl}_4]^{2-}$ will be

- (i) $18,000 \text{ cm}^{-1}$
- (ii) $16,000 \text{ cm}^{-1}$
- (iii) $8,000 \text{ cm}^{-1}$
- (iv) $20,000 \text{ cm}^{-1}$

4. Which of the following statements is not correct about order of a reaction.

- (i) The order of a reaction can be a fractional number.
- (ii) Order of a reaction is experimentally determined quantity.
- (iii) The order of a reaction is always equal to the sum of the stoichiometric coefficients of reactants in the balanced chemical equation for a reaction.
- (iv) The order of a reaction is the sum of the powers of molar concentration of the reactants in the rate law expression.

5. Which of the following is amphoteric oxide? Mn_2O_7 , CrO_3 , Cr_2O_3 , CrO , V_2O_5 , V_2O_4

- (i) V_2O_5 , Cr_2O_3
- (ii) Mn_2O_7 , CrO_3

(iii) CrO , V_2O_5

(iv) V_2O_5 , V_2O_4

6. Toluene reacts with a halogen in the presence of iron (III) chloride giving ortho and para halo compounds. The reaction is

(i) Electrophilic elimination reaction

(ii) Electrophilic substitution reaction

(iii) Free radical addition reaction

(iv) Nucleophilic substitution reaction

7. Which of the following is most acidic?

(i) Benzyl alcohol

(ii) Cyclohexanol

(iii) Phenol

(iv) m-Chlorophenol

8. The process of converting alkyl halides into alcohols involves _____. (i) addition reaction (ii) substitution reaction (iii) dehydrohalogenation reaction (iv) rearrangement reaction

9. Monochlorination of toluene in sunlight followed by hydrolysis with aq. NaOH yields.

(a) o-Cresol (b) w-Cresol

(c) 2, 4-Dihydroxytoluene (d) Benzyl alcohol

10. A first order reaction is 50% completed in 1.26×10^{14} s. How much time would it take for 100% completion?

(i) 1.26×10^{15} s

(ii) 2.52×10^{14} s

(iii) 2.52×10^{28} s

(iv) infinite

11. IUPAC name of m-cresol is _____. (i) 3-methylphenol (ii) 3-chlorophenol (iii) 3-methoxyphenol (iv) benzene-1,3-diol

12. Glycogen is a branched chain polymer of α -D-glucose units in which chain is formed by C1-C4 glycosidic linkage whereas branching occurs by the formation of C1-C6 glycosidic linkage. Structure of glycogen is similar to

(a) amylose (b) amylopectin (c) cellulose (d) glucose

Note: In the following questions a statement of assertion followed by a statement of reason is given.

Choose the correct answer out of the following choices.

- (i) Both assertion and reason are correct and the reason is correct explanation of assertion.
- (ii) Both assertion and reason are correct but reason does not explain assertion.
- (iii) Assertion is correct but reason is incorrect.
- (iv) Both assertion and reason are incorrect.
- (v) Assertion is incorrect but reason is correct.

13. Assertion : Formaldehyde is a planar molecule.
Reason : It contains sp^2 hybridised carbon atom

14. Assertion : Compounds containing $-CHO$ group are easily oxidised to corresponding carboxylic acids.

Reason : Carboxylic acids can be reduced to alcohols by treatment with $LiAlH_4$.

15. Assertion : Acylation of amines gives a monosubstituted product whereas alkylation of amines gives polysubstituted product.

Reason : Acyl group sterically hinders the approach of further acyl groups.

16 Assertion (A): Aldehydes and ketones, both react with Tollen's reagent to form silver mirror.

Reason (R): Both, aldehydes and ketones contain a carbonyl group.

SECTION: B

17. Explain why on addition of 1 mol of NaCl to 1 litre of water, the

boiling point of water increases, while addition of 1 mol of methyl alcohol to one litre of water decreases its boiling point.

18. Can Cell E^0_v or ΔrG^0_v for cell reaction ever be equal to zero?

19. Magnetic moment of $[\text{MnCl}_4]^{2-}$ is 5.92 BM. Explain giving reason

20. Under what conditions glucose is converted to gluconic and saccharic acid?

21. The halides of transition elements become more covalent with increasing oxidation state of the metal. Why?

SECTION C

22. (a) Explain the following phenomena with the help of Henry's law.

(i) Painful condition known as bends.

(ii) Feeling of weakness and discomfort in breathing at high altitude.

(b) Why soda water bottle kept at room temperature fizzes on opening?

23. What is the relationship between Gibbs free energy of the cell reaction in a galvanic cell and the emf of the cell? When will the maximum work be obtained from a galvanic cell?

24. Using valence bond theory, explain the following in relation to the complexes given below: $[\text{Mn}(\text{CN})_6]^{3-}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$, $[\text{FeCl}_6]^{4-}$

(i) Type of hybridisation.

(ii) Inner or outer orbital complex.

(iii) Magnetic behaviour.

(iv) Spin only magnetic moment value.

25. Can Gatterman-Koch reaction be considered similar to Friedel Craft's acylation? Discuss.

26. Unlike dry cell, the mercury cell has a constant cell potential throughout its useful life. Why?

27. Carboxylic acids contain carbonyl group but do not show the nucleophilic addition reaction like aldehydes or ketones. Why?

28 . For a certain reaction, large fraction of molecules has energy more than the threshold energy, yet the rate of reaction is very slow. Why?

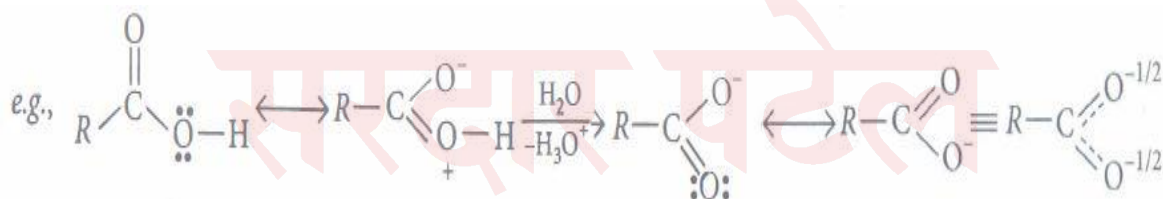
Section D

The following questions are case-based questions. Each question has an internal choice and carries 4 (2+1+1) marks each. Read the passage carefully and answer the questions that follow

Q29. Carboxylic acids dissociate in water to give carboxylate ion and hydronium ion.



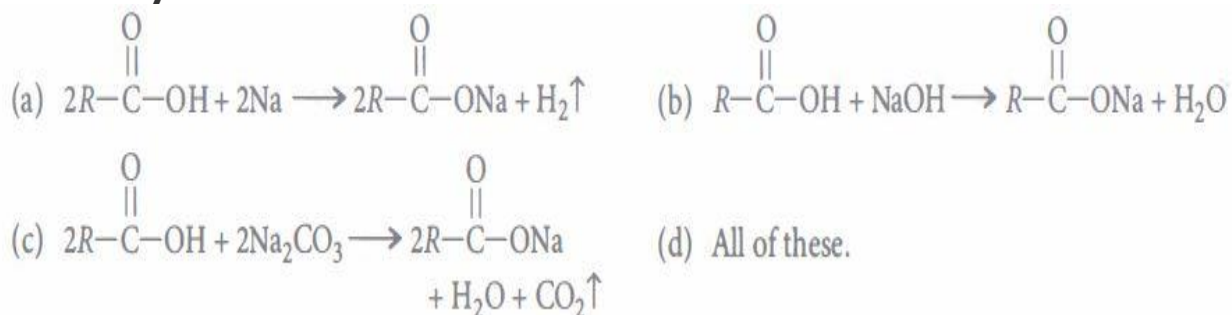
The acidity of carboxyl group is due to the presence of positive charge on oxygen which liberates proton. The carboxylate ion formed is resonance stabilised.



Carboxylic acids are stronger acids than phenols. Electron withdrawing groups (EWG) increase the acidity of carboxylic acids by stabilising the conjugate base through delocalisation of negative charge by inductive and/ or resonance effects. Electron donating group (EDG) decrease the acidity by destabilising the conjugate base.

The following questions are multiple choice questions. Choose the most appropriate answer :

(i) Which of the following reactions is showing the acidic property of carboxylic acid?



(ii) Which one of the following is the correct order of acidic strength?

- (a) $\text{CF}_3\text{COOH} > \text{CHCl}_2\text{COOH} > \text{HCOOH} > \text{C}_6\text{H}_5\text{CH}_2\text{COOH} > \text{CH}_3\text{COOH}$
 (b) $\text{CH}_3\text{COOH} > \text{HCOOH} > \text{CF}_3\text{COOH} > \text{CHCl}_2\text{COOH} > \text{C}_6\text{H}_5\text{CH}_2\text{COOH}$
 (c) $\text{HCOOH} > \text{C}_6\text{H}_5\text{CH}_2\text{COOH} > \text{CF}_3\text{COOH} > \text{CHCl}_2\text{COOH} > \text{CH}_3\text{COOH}$
 (d) $\text{CF}_3\text{COOH} > \text{CH}_3\text{COOH} > \text{HCOOH} > \text{CHCl}_2\text{COOH} > \text{C}_6\text{H}_5\text{CH}_2\text{COOH}$

(iii) Which of the following acids has the smallest dissociation constant?

- (a) $\text{CH}_3\text{CHFCOOH}$ (b) $\text{FCH}_2\text{CH}_2\text{COOH}$
 (c) $\text{BrCH}_2\text{CH}_2\text{COOH}$ (d) $\text{CH}_3\text{CHBrCOOH}$

30. Read the passage given below and answer the following questions:

The amines are basic in nature due to the presence of a lone pair of electron on N-atom of the $-\text{NH}_2$ group, which it can donate to electron deficient compounds. Aliphatic amines are stronger bases than NH_3 because of the +1 effect of the alkyl groups. Greater the number of alkyl groups attached to N-atom, higher is the electron density on it and more will be the basicity. Thus, the order of basic nature of amines is expected to be $3^\circ > 2^\circ > 1^\circ$, however the observed order is $2^\circ > 1^\circ > 3^\circ$. This is explained on the basis of crowding on N-atom of the amine by alkyl groups which hinders the approach and bonding by a proton, consequently, the electron pair which is present on N is unavailable for donation and hence 3° amines are the weakest bases. Aromatic amines are weaker bases than ammonia and aliphatic amines. Electron -donating groups such as $-\text{CH}_3$, $-\text{OCH}_3$, etc. increase the basicity while electron-withdrawing substitutes such as $-\text{NO}_2$, $-\text{CN}$, halogens, etc. decrease the basicity of amines. The effect of these substituents is more at p than at m-positions.

The following questions are multiple choice questions. Choose the most appropriate answer :

(i) Which one of the following is the strongest base in aqueous solution?

(a) Methyl amine	(b) Trimethyl amine	(c) Aniline	(d) Dimethyl amine
------------------	---------------------	-------------	--------------------

(ii) Which order of basicity is correct?

- (a) Aniline > m-toluidine > o-toluidine

- (b) Aniline > o-toluidine > m-toluidine
(c) o-toluidine > aniline > m-toluidine
(d) o-toluidine < aniline < m-toluidine
- (iii) What is the decreasing order of basicity of primary, secondary and tertiary ethylamines and NH_3 ?
- (a) $\text{NH}_3 > \text{C}_2\text{H}_5\text{NH}_2 > (\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N}$
(b) $(\text{C}_2\text{H}_5)_3\text{N} > (\text{C}_2\text{H}_5)_2\text{NH} > \text{C}_2\text{H}_5\text{NH}_2 > \text{NH}_3$
(c) $(\text{C}_2\text{H}_5)_2\text{NH} > \text{C}_2\text{H}_5\text{NH}_2 > (\text{C}_2\text{H}_5)_3\text{N} > \text{NH}_3$
(d) $(\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N} > \text{C}_2\text{H}_5\text{NH}_2 > \text{NH}_3$

SECTION E

The following questions are long answer types and carry 5 marks each. All questions have an internal choice.

31. Allyl chloride is hydrolysed more readily than n-propyl chloride. Why?

OR

Why is it necessary to avoid even traces of moisture during the use of a Grignard reagent?

32 . Describe how does the enthalpy of reaction remain unchanged when a catalyst is used in the reaction.

OR

(a) Transition metals can act as catalysts because these can change their oxidation state. How does Fe(III) catalyse the reaction between iodide and persulphate ions?

(b) Mention any three processes where transition metals act as catalysts

33. Why is the reactivity of all the three classes of alcohols with conc. HCl and ZnCl_2 (Lucas reagent) different?

OR

Write steps to carry out the conversion of phenol to aspirin.

