DAY THIRTY SEVEN

Unit Test 6

(Organic Chemistry-II)

1 Identify the correct statement regarding enzymes.

(a) Enzymes are specific biological catalysts that can normally function at very high temperature (T~1000 K)

(b) Enzymes are normally heterogeneous catalysts that are very specific in their actions

(c) Enzymes are specific biological catalysts that cannot be poisoned

(d) Enzymes are specific biological catalysts that possess well defined active sites

2 Which of the following is not optically active?

(a) Glycine (b) Alanine

(c) Tyrosine (d) Lysine

3 Isoelectric point is a

(a) specific temperature

(b) suitable concentration of amino acid

(c) hydrogen ion concentration that does not allow migration of amino acid under electric field

(d) melting point of an amino acid under the influence of electric field

4 From the following statements, which one is incorrect?

(a) Albumin is a simple protein

(b) Amino acid lysine contains a basic side chain

(c) Insulin is a hormone

(d) Muscles contain the protein keratin

5 Which of the following statements is not true about glucose? → NCERT Exemplar

(a) It is an aldohexose

(b) On heating with HI, it forms *n*-hexane

(c) It is present in furanose form

(d) It does not give 2,4-DNP test

6 When glucose reacts with bromine water, the main product is

(a) acetic acid (b) saccharic acid

(c) glyceraldehyde (d) gluconic acid

7 Match the following and choose the correct option.

	Column I		Column II
A.	Analgesics	1.	Treatment of stress
B.	Antihistamines	2.	Pain-killing effect
C.	Tranquilizers	3.	Applied to inanimate objects
D.	Disinfectants	4.	Prevents the interaction of histamine with its receptor

Codes

	A	B	C	D
(a)	4	3	1	2
(b)	2	4	1	3
(c)	1	2	4	3
(d)	3	4	2	1

8 Amylopectin is a polymer of

(a) α-D-glucose (b) α-D-fructose

(c) lactose (d) amylose

Direction (Q. Nos. 9-10) *In the following questions, Assertion followed by Reason is given. Choose the correct answer out of the following choices.*

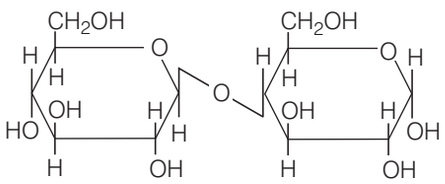
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion

(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion

(c) Assertion is true but Reason is false

(d) Both Assertion and Reason are false

9 **Assertion** (A) β -glycosidic linkage is present in maltose.



Reason (R) Maltose is composed of two glucose units in which C-1 of one glucose unit is linked to C-2 of another glucose unit.

10 **Assertion** (A) Polytetrafluoroethene is used in making non-stick cookwares.

Reason (R) Fluorine has highest electronegativity.

→ NCERT Exemplar

11 Food preservatives prevent spoilage of food due to microbial growth. The most commonly used preservatives are

(a) table salt, sugar
(b) vegetable oils and sodium benzoate.
(c) C_6H_5COONa
(d) All of the above

12 Which is not the correct matching of medicine with its disease/activity?

(a) Antihistamines — anti-allergic
(b) Barbiturates — hypnotic
(c) Chloramphenicol — typhoid
(d) 1% phenol — antiseptic

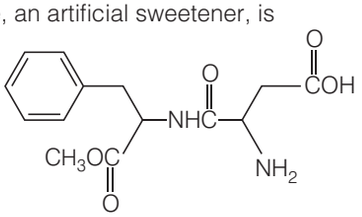
13 Dettol is a mixture of

(a) chloroxylenol and terpeneol
(b) phenol and chlorophenol
(c) phenol and chloroxylenol
(d) chlorophenol and chloroxylenol

14 Sodium benzoate is used as food preservative. It is

(a) metabolised by conversion to hippuric acid and is excreted in the urine
(b) metabolised to benzoic acid and deposited in the bond
(c) decomposed by gastric juice and escapes as CO_2
(d) decomposed by heat of the digestion process and escapes as CO_2

15 Aspartame, an artificial sweetener, is



Functional groups, which are not present in aspartame, are

(a) ester, peptide, amino, carboxyl
(b) hydroxyl, keto, methoxy
(c) Both (a) and (b)
(d) None of the above

16 Glyptal polymer is obtained by the reaction of phthalic acid with

(a) glycerol (b) ethylene glycol
(c) acetic acid (d) malonic acid

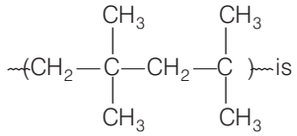
17 Structurally, the cellulose is a linear polymer of

(a) sucrose molecules (b) β-D-glucose molecules
(c) α-D-glucose molecules (d) fructose molecules

18 The baby feeding bottles are made up of

(a) polyester (b) polyurethane
(c) polystyrene (d) polyamide

19 The monomer of the polymer



(a) $CH_2=C(CH_3)_2$ (b) $(CH_3)_2C=C(CH_3)_2$
(c) $CH_3CH=CHCH_3$ (d) $CH_3CH=CH_2$

20 The monomers used for the preparation of nylon-2-nylon-6 is/are → [NCERT Exemplar]

(a) caprolactum
(b) alanine and amino caproic acid
(c) glycine and amino caproic acid
(d) hexamethylenediamine and adipic acid

21 Which of the following is a monomer of teflon?

(a) Difluoro ethane (b) Trifluoro ethane
(c) Tetrafluoro ethene (d) None of these

22 A salt is heated first with dil. H_2SO_4 and then with conc. H_2SO_4, no reaction takes place. It may be

(a) nitrate (b) sulphide (c) oxalate (d) sulphate

23 When Cl_2 water is added to a salt solution containing chloroform, chloroform layer turns violet. The salt contains

(a) Cl^- (b) I^- (c) NO_3^- (d) S^{2-}

24 Which will give borax bead test with blue bead?

(a) Cr^{3+} (b) Co^{3+} (c) Ni^{2+} (d) Cd^{2+}

25 Which of the following leaves no residue on heating?

(a) $Pb(NO_3)_2$ (b) NH_4NO_3 (c) $Cu(NO_3)_2$ (d) $NaNO_3$

26 Mark the compound which turns black with NH_4OH.

(a) Lead chloride (b) Mercurous chloride
(c) Mercuric chloride (d) Silver chloride

27 There is foul smell in presence of moisture with

(a) $AlCl_3$ (b) $Al_2(SO_4)_3$ (c) FeS (d) $FeSO_4$

28 A colourless salt changes to yellow on heating. Salt is also soluble in NaOH as well as in dil. HCl. Salt can be

(a) FeO (b) PbO (c) ZnO (d) CdO

29 A glycoside is the carbohydrate form of a/an

(a) ether (b) acetal (c) glycone (d) alcohol

30 Reduction of hexose *A* (mol. formula, $C_6H_{12}O_6$) with $NaBH_4$ gives compounds *B* and *C*. Compound *B* is optically inactive and compound *C* is optically active. Which of the following is compound *A*?

(a) D-fructose (b) D-glucose (c) D-mannose (d) D-psicose

31 Which of the following is true about teflon?

(a) It is linear, unbranched polymer of tetrafluoroethylene
(b) It has very high thermal stability
(c) The polymer molecules are associated by strong dipole-dipole attraction
(d) All of the above

32 Cellulose has very high degree of hydrophilicity because of

(a) its amorphous nature
(b) crystalline nature

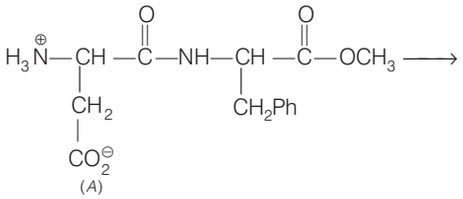
(c) presence of excessive voids in solid state
(d) presence of many hydroxyl groups on the polymer backbone

33 Which one among the following is not an analgesic?
(a) Ibuprofen (b) Naproxen
(c) Valium (d) Aspirin

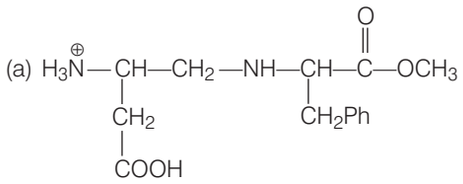
34 Nucleoside involves the combination of
(a) sugar + base + H_3PO_4 (b) sugar + base
(c) sugar + acid (d) sugar + H_3PO_4

35 On hydrolysis of caprolactum, a compound (*B*) is obtained. On polymerisation of (*B*), product (*C*) is formed. (*C*) is
(a) saran (b) nylon-6 (c) terylene (d) bakelite

36 The artificial sweetener aspartame (*A*) is converted to ..... on storage for extended period of time in aqueous solution.



(*A*)

(a)


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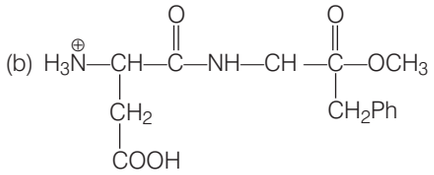
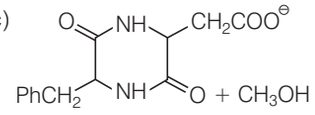


(c)


(d) No change, remains as *A*

37 A carbohydrate is treatd with α –naphthol and conc. H_2SO_4. What colour will be formed at the junction of two liquids?
(a) Blood red (b) Violet
(c) Brown (d) Orange

38 (*A*) is a ternary salt with divalent cation. (*A*) gives yellow ppt. with K_2CrO_4 as well as with $AgNO_3$. (*A*) is precipitated by H_2S neither in acidic nor ammoniacal medium, but addition of $(NH_4)_2CO_3$ in NH_4OH gave white ppt. (*B*). 0.297 g of (*A*) gave 0.197 g of (*B*). Identify (*A*).
(a) $BaBr_2$ (b) Cu_2S (c) $FeSO_4$ (d) $ZnCl_2$

39 A shallow eutrophic water lake located in a region where the bedrock and sediments contain limestone, has a pH 7.2 and equilibrium constant $K_a = 4.7 \times 10^{-11}$ for the reaction.

$$H_2O + HCO_3^- \rightleftharpoons H_3O^+ + CO_3^{2-}$$

Concentrations of HCO_3^- and H_3O^+ are respectively 1.06×10^{-3} mol L^{-1} and 6.3×10^{-8} mol L^{-1}. If the concentration of Ca^{2+} is 1.5×10^{-3} mol^{-1} and K_{sp} of $CaCO_3 = 5 \times 10^{-9}$. Would the precipitation of $CaCO_3$ take place?
(a) Precipitation will take place
(b) Precipitation will not take place
(c) It may or may not take place
(d) Cannot be predicted

40 To an aqueous solution containing anions from a few drops of acidified $KMnO_4$ are added. Which one of the following anions, if present will not decolourise the $KMnO_4$ solution?
(a) I^- (b) CO_3^{2-}
(c) S^{2-} (d) NO_2^-

41 In the brown ring test, the brown colour of the ring is due to
(a) ferrous nitrate (b) ferric nitrate
(c) a mixture of NO and NO_2 (d) ferrous nitrososulphate

42 What colour is imparted into the flame when lithium is burnt?
(a) Golden yellow (b) Brick red
(c) Crimson red (d) Grassy green

43 Give the pOH range for the isoelectric point of the amphoteric ion of an amino acid?
(a) 5.5 to 6.3 (b) 2.5 to 5.0
(c) 7.7 to 8.5 (d) 9.0 to 10.7

44 Which of the following describes the overall three dimensional folding of a polypeptide?
(a) Primary structure (b) Secondary structure
(c) Tertiary structure (d) Quaternary structure

Direction (Q. Nos. 45-46) *Each of these questions contains two statements : Statement* I *(Assertion) and Statement* II *(Reason). Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes* (*a*), (*b*), (*c*) and (*d*) *given below:*

(a) Statement I is true, Statement II is true; Statement II is the correct explanation for Statement I
(b) Statement I is true, Statement II is true; Statement II is not the correct explanation for Statement I
(c) Statement I is true; Statement II is false
(d) Statement I is false; Statement II is true

45. **Statement** I Fructose because of the presence of keto group does not reduce Tollen's reagent.
Statement II Fructose is also called fruit sugar.

46. **Statement** I MnS is pink in colour which on dissolution in dil. HCl and then heating with NaOH and Br_2 gives pink colour solution changing to brown on heating.
Statement II Mn^{2+} is oxidised to Mn^{4+}.

ANSWERS

1. (d)	**2.** (a)	**3.** (c)	**4.** (d)	**5.** (c)	**6.** (d)	**7.** (b)	**8.** (a)	**9.** (d)	**10.** (c)
11. (d)	**12.** (d)	**13.** (a)	**14.** (a)	**15.** (b)	**16.** (b)	**17.** (b)	**18.** (c)	**19.** (a)	**20.** (c)
21. (c)	**22.** (d)	**23.** (b)	**24.** (b)	**25.** (b)	**26.** (b)	**27.** (c)	**28.** (c)	**29.** (b)	**30.** (d)
31. (d)	**32.** (d)	**33.** (c)	**34.** (b)	**35.** (b)	**36.** (c)	**37.** (b)	**38.** (a)	**39.** (b)	**40.** (b)
41. (d)	**42.** (c)	**43.** (c)	**44.** (c)	**45.** (d)	**46.** (a)				

Hints and Explanations

1. Normal optimum temperature of enzymes is between 25°C to 40°C, hence (a) is false, enzymes have well defined active sites and hence, their actions are specific in nature.

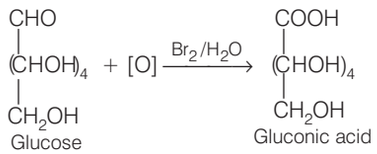
2. Glycine (an amino acid) is optically inactive compound.

3. Isoelectric point is a pH at which *Zwitter* ion does not migrate towards any of the electrodes. Since, amino acids are also *Zwitter* ions, hence, they do not migrate under the influence of electric field at isoelectric point.

4. Muscles contain myosin protein. Keratin is present in hair, wool and silk.

5. Glucose is never present in furanose form.

6. When glucose reacts with Br_2 water, gluconic acid is obtained as main product.



7.

A.	Analgesics	Pain killing effect
B.	Antihistamines	Prevents the interaction of histamine with its receptor
C.	Tranquilizers	Treatment of stress
D.	Disinfectants	Applied to inanimate objects

8. Amylopectin is a highly branched polymer of α – D glucose units which are joined together through α-glycosidic linkages involving C_1 of one glucose unit with C_4 of the other.

9. **Correct Assertion** α-glycosidic linkage is present in maltose. Correct reason maltose is a composed of two α-D-glucose units in which C-1 of one glucose unit (I) is linked to C-4 of another glucose unit (II).

10. **Correct Explanation** Because of great chemical inertness and high thermal stability, teflon (polytetrafluoroethene) is used in making non-stick cookwares.

11. The chemicals which are used to protect food from microbes action are known as food preservatives. Table salt, vegetable oil, sugar, vinegar, sodium benzoate ($C_6H_5COO^-Na^+$) sodium metabisulphite ($Na_2S_2O_5$), vitamin E etc. are food preservatives.

12. 1% phenol is a disinfectant while 0.2% phenol is an antiseptic

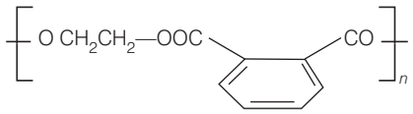
13. Dettol is a mixture of chloroxylenol and terpeneol.

14. Sodium benzoate is used as food preservative. It is metabolised to hippuric acid and excreted in urine. It is used in soft drinks and acidic foods.

15. Hydroxyl, keto, methoxy groups are absent in aspartame while ester, peptide amino an carboxyl groups are present.

16. Glyptal is obtained by the reaction of phthalic acid with ethylene glycol.

Structure of glyptals :



17. Cellulose is a linear condensation polymer of β-D- glucose in which C_1 of one glucose unit is connected to C_4 of the other through β -D-glycosidic linkage.

18. Polystyrene is used for the production of baby feeding bottles.

19. $CH_2=C(CH_3)_2$ is the repeating unit of given polymer.

20. $n\underset{\text{Glycine}}{H_2NCH_2COOH} + n\underset{\text{Amino caproic acid}}{H_2N(CH_2)_5COOH} \longrightarrow$

$$\underset{\text{Nylon-2-nylon-6}}{+[NH-CH_2-CONH-(CH_2)_5-\overset{O}{\overset{\|}{C}}-]}$$

21. Teflon is an addition polymer of tetrafluoroethylene.

$$\underset{\text{Tetrafluoroethylene}}{nF_2C=CF_2} \xrightarrow[\text{Pressure}]{\text{Heat}} \underset{\text{Teflon}}{[F_2C-CF_2]_n}$$

22. SO_4^{2-} does not react with either dilute or conc. H_2SO_4.

23. $2I^- + Cl_2 \longrightarrow I_2 + 2Cl^-$

I_2 gives violet colour to the chloroform layer.

24. Co^{3+} will give blue bead in borax bead test.

25. $NH_4NO_3 \xrightarrow{\Delta} N_2O\uparrow + 2H_2O\uparrow$

26. Mercurous chloride (Hg_2Cl_2) compound turns black with NH_4OH

$$Hg_2Cl_2 + 2NH_4OH \longrightarrow Hg\downarrow + \underset{\text{Black}}{Hg\cdot NH_2Cl} + 2H_2O + NH_4Cl$$

27. $FeS + 2H_2O \longrightarrow Fe(OH)_2 + \underset{\text{Foul smell}}{H_2S}$

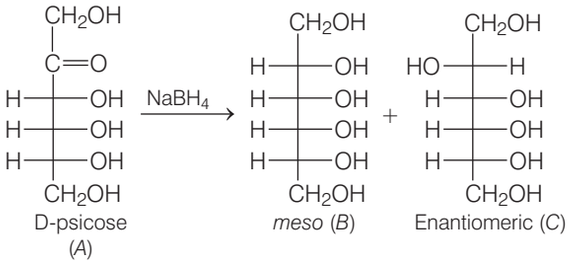
28. ZnO is colourless and changes to yellow on heating.

$$ZnO + 2HCl \longrightarrow ZnCl_2 + H_2O$$

$$ZnO + 2NaOH \longrightarrow Na_2ZnO_2 + H_2O$$

29. Acetal form of carbohydrates are known as glycoside.

30.



D-psicose (*A*) | *meso* (*B*) | Enantiomeric (*C*)

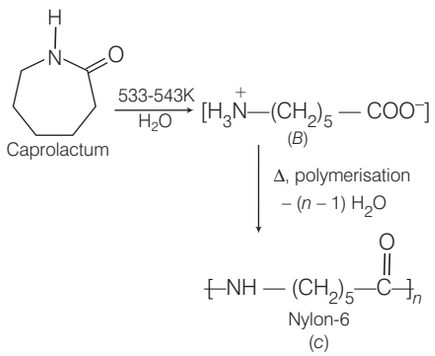
31. Due to symmetry of $F_2C{=}CF_2$ (teflon) and strength of C—F bond, branching doesn't takes place and a linear polymer is formed. High bond energy of C—F bond gives high thermal stability to polymer. Large electronegativity difference of C and F makes C—F bonds highly polar.

32. Cellulose fibres are hydrophilic due to the presence of OH groups at their surfaces.

33. Valium is white all other gives option are the examples of analgesics.

34. A combination of sugar and base is called nucleoside and a combination of sugar, base and phosphate is called nucleotide.

35.



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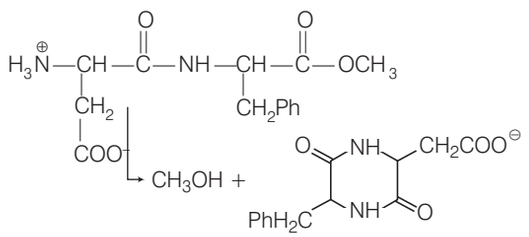

37. This is Molisch's test for carbohydrates. In this experiment, violet ring is formed at the junction of two liquids.

38. (*A*) gives yellow ppt. with K_2CrO_4 as well as with $AgNO_3$. Therefore, (*A*) can have Pb^{2+} or Ba^{2+} (both divalent cations) and Br^-. (*A*) is not precipitated by H_2S in acidic and ammoniacal medium. Hence, (*A*) does not have Pb^{2+} (precipitated as PbS in acidic medium by H_2S gas).

(*A*) contains Ba^{2+} (apple green flame).

$\therefore$ (*A*) is $BaBr_2$.

$$BaBr_2 + 2AgNO_3 \longrightarrow \underset{\text{Yellow}}{2AgBr\downarrow} + Ba(NO_3)_2$$

$$BaBr_2 + K_2CrO_4 \longrightarrow \underset{\text{Yellow}}{BaCrO_4\downarrow} + 2KBr$$

$$\underset{A}{BaBr_2} + (NH_4)_2CO_3 \longrightarrow \underset{B}{BaCO_3} + 2NH_4Br$$

39. Equilibrium constant for reaction:

$$K_a = \frac{[H_3O^+]\,[CO_3^{2-}]}{[HCO_3^-]\,[H_2O]}$$

$$[CO_3^{2-}] = \frac{4.7\times10^{-11}\times1.06\times10^{-3}}{6.3\times10^{-8}}$$

$$= 7.9\times10^{-7}\text{mol L}^{-1}$$

The reaction quotient for the reaction

$$Ca^{2+} + CO_3^{2-} \rightleftharpoons CaCO_3$$

$$Q = [Ca^{2+}]\,[CO_3^{2-}]$$

$$= 1.5\times10^{-3}\times7.9\times10^{-7}$$

$$= 1.2\times10^{-9} < 5\times10^{-9} = K_{sp}$$

Hence, no precipitation will take place.

40. In CO_3^{2-}, C is present in its highest oxidation state, i.e +4 state, so its further oxidation is not possible, it only undergoes reduction. Acidified $KMnO_4$ is a strong oxidising agent but it cannot oxidise CO_3^{2-}.

41. On adding freshly prepared $FeSO_4$ solution and then conc. H_2SO_4 to water extract of salt mixture carefully by the sides of test-tube, a dark brown ring of ferrous nitrosoulphate, $FeSO_4NO$ is formed.

42.

Colour	Cation
Golden yellow	Na^+
Brick red	Ca^{2+}
Crimson red	Li^+
Grassy green	Cu^{2+}, BO_3^{3-}, Tl^{3+}

43. The pH at which a particular amino acid does not migrate under the influence of an electric field is called isoelectric point of that amino acid.

The pH range for the isoelectric point is from 5.5 to 6.3 on the pOH range for the isoelectric point is from 7.7 to 8.5.

44. The tertiary structure of proteins refer to three dimensional folding of polymer chain.

45. Fructose although have keto group but it reduces Tollen's reagent to give silver mirror. It is also called fruit sugar.

46.

$$MnS + \text{dil.}HCl \longrightarrow MnCl_2$$

$$MnCl_2 + 2NaOH \longrightarrow Mn(OH)_2 + 2NaCl$$

$$Mn(OH)_2 + [O] \xrightarrow{NaOH + Br_2} \underset{\text{(Brown)}}{MnO_2} + H_2O$$