

# Biomolecules, Chemistry in Everyday Life and Environmental Chemistry

## TOPIC 1 Biomolecules

**01** Given below are two statements.

**Statement I** Aspirin and paracetamol belong to the class of narcotic analgesics.

**Statement II** Morphine and heroin are non-narcotic analgesics. In the light of the above statements, choose the correct answer from the options given below.

[NEET (Oct.) 2021]

- (a) Both Statement I and Statement II are true.
- (b) Both Statement I and Statement II are false.
- (c) Statement I is true but Statement II is false.
- (d) Statement I is false but Statement II is true.

**Ans. (b)**

**Narcotic analgesics** They are the analgesics drugs that are used to reduce pain. They are obtained from opium poppy, so they are also called opiates. They are addictive in nature. Morphine and heroin are narcotic analgesics.

**Non-narcotic analgesics** They are non-addictive in nature and are not obtained from opium poppy. Aspirin and paracetamol are non-narcotic analgesics. So, both statements I and II are false.

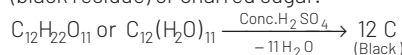
**02** The reaction of concentrated sulphuric acid with carbohydrates ( $C_{12}H_{22}O_{11}$ ) is an example of

[NEET (Oct.) 2020]

- (a) dehydration
- (b) oxidation
- (c) reduction
- (d) sulphonation

**Ans. (a)**

Conc.  $H_2SO_4$  removes water, i.e. dehydrates carbohydrates into carbon (black residue) or charred sugar.



**03** Deficiency of which vitamin causes osteomalacia? [NEET (Oct.) 2020]

- (a) Vitamin A
- (b) Vitamin D
- (c) Vitamin K
- (d) Vitamin E

**Ans. (b)**

Deficiency of

Vitamin A causes—Xerophthalmia

Vitamin D causes—Osteomalacia and Rickets

Vitamin E causes—Fragility of RBCs

Vitamin K causes—Increase in blood clotting time.

Hence, option (b) is correct.

**04** Which of the following statements is not true about glucose? [NEET (Oct.) 2020]

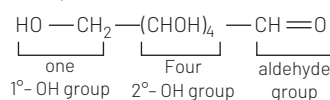
- (a) It is an aldohexose.
- (b) It contains five hydroxyl groups.
- (c) It is a reducing sugar.
- (d) It is an aldopentose.

**Ans. (d)**

Glucose ( $C_6H_{12}O_6$ ) can be simply shown as,  $\Rightarrow$  Shows reducing property.

So, glucose is an aldohexose (made of six carbon atoms) and it is a reducing sugar. Containing five  $-OH$  groups.

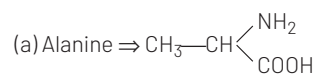
Hence, option (d) is incorrect statement.



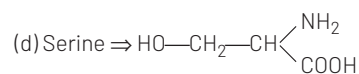
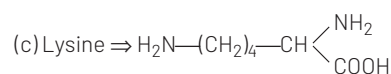
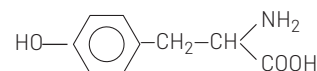
**05** Which of the following is a basic amino acid? [NEET (Sep.) 2020]

- (a) Alanine
- (b) Tyrosine
- (c) Lysine
- (d) Serine

**Ans. (c)**



(b) Tyrosine  $\Rightarrow$



Since, lysine contains more number of  $-\text{NH}_2$  groups as compared to  $-\text{COOH}$  groups, hence it is a basic amino acid.

**06** The non-essential amino acid among the following is [NEET (National) 2019]

- (a) leucine
- (b) alanine
- (c) lysine
- (d) valine

**Ans. (b)**

The amino acids that can be synthesised in our body and hence are not essentially required in our diet are called non-essential amino acids. e.g. glycine, alanine, serine, proline, cysteine, glutamine, tyrosine, aspartic acid, glutamic acid, asparagine. Rest given options are essential amino acids, i.e. those can't be synthesised in our body hence essentially required in our diet. Their other examples are isoleucine, phenylalanine, methionine, tryptophan, threonine, arginine and histidine.

Hence, option (b) is correct.

**07** Which of the following compounds can form a Zwitter ion? [NEET 2018]

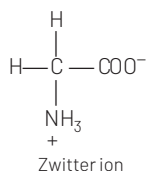
- (a) Benzoic acid (b) Acetanilide  
(c) Aniline (d) Glycine

**Ans. (d)**

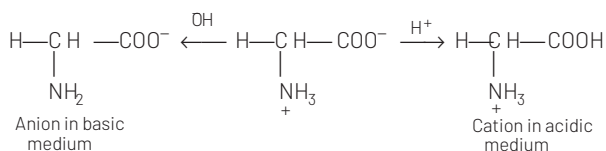
**Key Concept** Ion containing positive as well as negative charge is called Zwitter ion.

Among the given options, only glycine ( $\text{H}_2\text{N}-\text{CH}_2-\text{COOH}$ ) is an amino acid which contains both acidic (acquiring negative charge) and basic group (acquiring positive charge).

Glycine can form a Zwitter ion. It is because glycine behave like salts rather than simple amines or carboxylic acids. In aqueous solution, the carboxyl group can lose a proton and amino group can accept a proton giving rise to a dipolar ion known as Zwitter ion.



Zwitter ion is a cation in acidic medium and migrates to cathode on passing electric current. It is an anion in basic medium and migrates to anode on passing electric current.



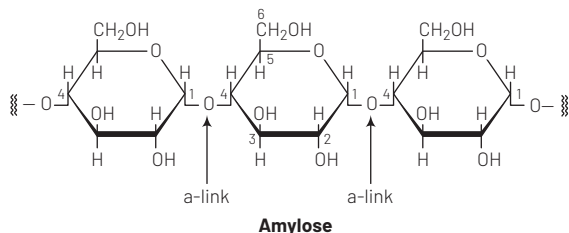
Thus, amino acid bears a positive charge in acidic solution (low pH) and a negative charge in basic solution (high pH). The pH at which the amino acid has no net charge is called isoelectric point. The isoelectric point of glycine is 5.97.

**08** The difference between amylose and amylopectin is [NEET 2018]

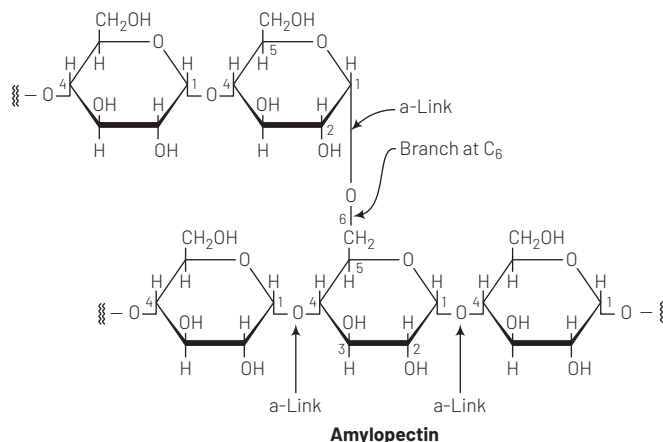
- (a) amylopectin have  $1 \rightarrow 4$   $\alpha$ -linkage and  $1 \rightarrow 6$   $\beta$ -linkage  
(b) amylose have  $1 \rightarrow 4$   $\alpha$ -linkage and  $1 \rightarrow 6$   $\beta$ -linkage  
(c) amylopectin have  $1 \rightarrow 4$   $\alpha$ -linkage and  $1 \rightarrow 6$   $\alpha$ -linkage  
(d) amylose is made up of glucose and galactose

**Ans. (c)**

Starch contains two components amylose and amylopectin. Chemically, amylose is a long unbranched chain with 200-1000  $\alpha$ -D-(+)-glucose units held by  $\text{C}_1$ - $\text{C}_4$  glycosidic linkage.



Amylopectin is a branched chain polymer of  $\alpha$ -D-glucose units in which chain is formed by  $\text{C}_1$ - $\text{C}_4$  glycosidic linkage where branching occurs by  $\text{C}_1$ - $\text{C}_6$  glycosidic linkage.



**09** Which of the following statements is not correct? [NEET 2017]

- (a) Insulin maintains sugar level in the blood of a human body  
(b) Ovalbumin is a simple food reserve in egg white  
(c) Blood proteins thrombin and fibrinogen are involved in blood clotting  
(d) Denaturation makes the proteins more active

**Ans. (d)**

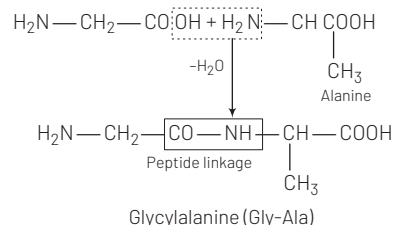
Deprotonation of protein occur when it is subjected to physical change like change in temperature or chemical change like change in pH, the hydrogen bonds are disturbed. As a result, globules unfolds and helix get uncoiled and protein losses its biological activity. Hence, the denaturation of protein makes the protein inactive.

**10** In a protein molecule various amino acids are linked together by [NEET 2016, Phase I]

- (a)  $\beta$ -glycosidic bond (b) peptide bond  
(c) dative bond (d)  $\alpha$ -glycosidic bond

**Ans. (b)**

Two amino acids in a protein are linked by a peptide bond. e.g. glycylalanine is formed when carboxyl group of glycine combines with the amino group of alanine.



**11** The correct statement regarding RNA and DNA, respectively is [NEET 2016, Phase I]

- (a) The sugar component in RNA is ribose and the sugar component in DNA is 2'-deoxyribose  
(b) The sugar component in RNA is arabinose and the sugar component in DNA is ribose  
(c) The sugar component in RNA is 2'-deoxyribose and the sugar component in DNA is arabinose  
(d) The sugar component in RNA is arabinose and the sugar component in DNA is 2'-deoxyribose

**Ans. (a)**

In DNA, two helically twisted strands connected together by steps. Each strand consists of alternating molecules of deoxyribose at 2'-position and phosphate groups.

On the other hand, in RNA, the pentose sugar has an identical structure with deoxyribose sugar except that there is an -OH group instead of -H on carbon atom 2'.

Hence, it is only called ribose.

**12** Which one given below is a non-reducing sugar?

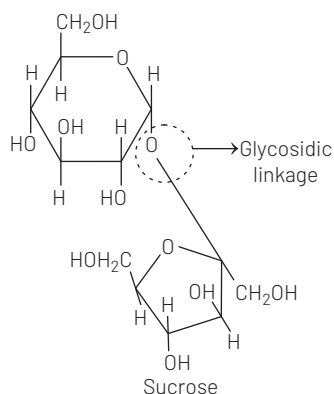
[NEET 2016, Phase I]

- (a) Lactose (b) Glucose  
(c) Sucrose (d) Maltose

**Ans. (c)**

Sucrose is non-reducing sugar because

reducing part of glucose ( $\text{—C=H}$ ) and fructose ( $\text{>C=O}$ ) are involved in glycosidic linkage.



While, lactose, glucose and maltose are reducing sugars.

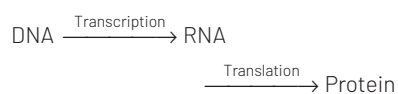
**13** The central dogma of molecular genetics states that the genetic information flows from

[NEET 2016, Phase II]

- (a) amino acids  $\rightarrow$  proteins  $\rightarrow$  DNA  
(b) DNA  $\rightarrow$  carbohydrates  $\rightarrow$  proteins  
(c) DNA  $\rightarrow$  RNA  $\rightarrow$  proteins  
(d) DNA  $\rightarrow$  RNA  $\rightarrow$  carbohydrates

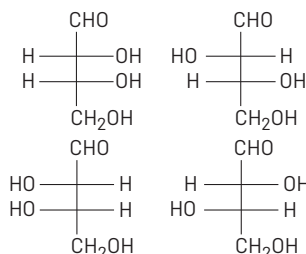
**Ans.**

(c) The central dogma of molecular genetics states that



Thus, option (c) is correct.

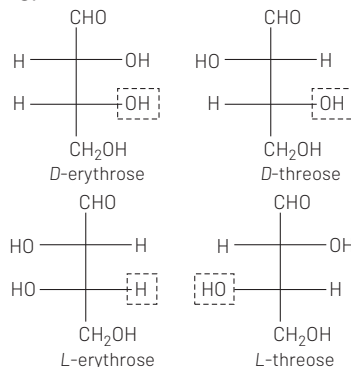
**14** The correct corresponding order of names of four aldoses with configuration given below



respectively, is [NEET 2016, Phase II]

- (a) L-erythrose, L-threose, L-erythrose, D-threose  
(b) D-threose, D-erythrose, L-threose, L-erythrose  
(c) L-erythrose, L-threose, D-erythrose, D-threose  
(d) D-erythrose, D-threose, L-erythrose, L-threose

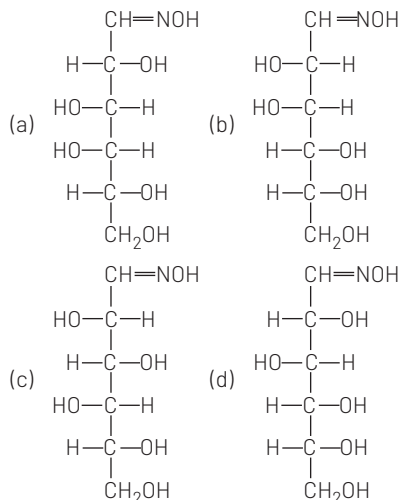
**Ans.**



Thus, the correct option is (d).

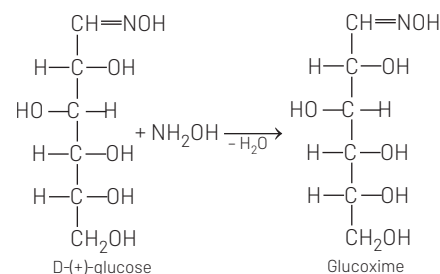
**15** D-(+)-glucose reacts with hydroxyl amine and yields an oxime. The structure of the oxime would be

[CBSE AIPMT 2014]



**Ans. (d)**

D-(+)-glucose contains aldehydic group which reacts with hydroxyl amine (NH<sub>2</sub>OH) to yield an oxime. The complete reaction is



**16** Which of the following hormones is produced under the condition of stress which stimulates glycogenolysis in the liver of human beings?

[CBSE AIPMT 2014]

- (a) Thyroxine (b) Insulin  
(c) Adrenaline (d) Estradiol

**Ans. (c)**

Adrenaline hormones increases pulse rate and controls blood pressure. It releases glucose from liver glycogen and fatty acids from fats in emergency.

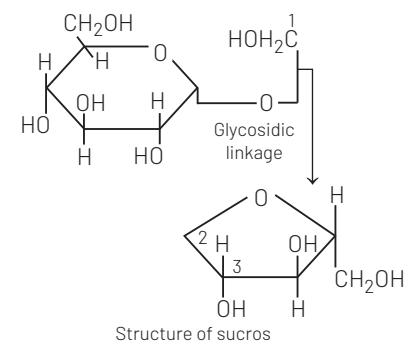
**17** Which one of the following sets of monosaccharides forms sucrose?

[CBSE AIPMT 2012]

- (a)  $\alpha$ -D-galactopyranose and  $\alpha$ -D-glucopyranose  
(b)  $\alpha$ -D-glucopyranose and  $\beta$ -D-fructofuranose  
(c)  $\beta$ -D-glucopyranose and  $\alpha$ -D-fructofuranose  
(d)  $\alpha$ -D-glucopyranose and  $\beta$ -D-fructopyranose

**Ans. (b)**

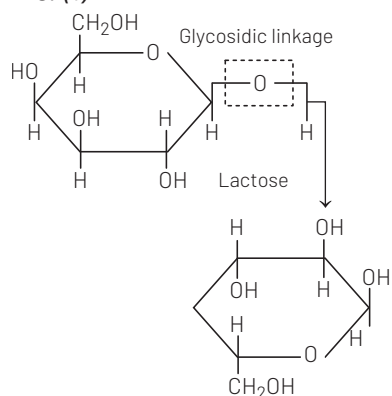
Sucrose is composed of  $\alpha$ -D-glucopyranose and a  $\beta$ -D-fructofuranose units which are joined by  $\alpha, \beta$ -glycosidic linkage between C-1 of the glucose unit and C-2 of the fructose unit



**18** Which one of the following statements is not true regarding (+) lactose? [CBSE AIPMT 2011]

- (a) (+) lactose is a  $\beta$ -glycoside formed by the union of a molecule of D-(+)-glucose and a molecule of D-(+)-galactose  
 (b) (+) lactose is a reducing sugar and does not exhibit mutarotation  
 (c) (+) lactose,  $C_{12}H_{22}O_{11}$  contains 8 O—H groups  
 (d) On hydrolysis (+) lactose gives equal amount of D-(+)-glucose and D-(+)-galactose

**Ans. (b)**



**19** Which one of the following is employed as antihistamine? [CBSE AIPMT 2011]

- (a) Diphenyl hydramine  
 (b) Norethindrone  
 (c) Omeprazole  
 (d) Chloramphenicol

**Ans. (a)**

Diphenylhydramine (benadryl) is used as an antihistamine.

**20** Which of the following does not exhibit the phenomena of mutarotation? [CBSE AIPMT 2010]

- (a)(+) Sucrose (b)(+) Lactose  
 (c)(+) Maltose (d)(-) Fructose

**Ans. (a)**

**Key Idea** Reducing sugars that exist in hemiacetal and hemiketal forms, exhibit the phenomenon of mutarotation in aqueous solution. During mutarotation, the ring open upto give the open chain form which then reclose either in the inverted position or in the original position giving an equilibrium mixture of two anomers with a small amount of open chain form. Thus, all reducing monosaccharides and disaccharides

undergo mutarotation in aqueous solution.

Among the given carbohydrates, only sucrose is a non-reducing sugar as in it the hemiacetal and hemiketal groups of glucose and fructose are linked together through O-atom and thus, not free. Due to the absence of free hemiacetal or hemiketal group, sucrose does not exhibit mutarotation.

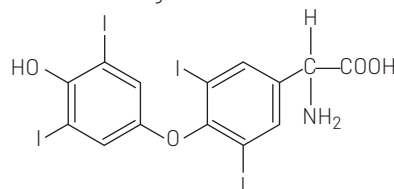
**21** Which of the following hormones contains iodine? [CBSE AIPMT 2009]

- (a) Insulin (b) Testosterone  
 (c) Adrenaline (d) Thyroxine

**Ans. (d)**

Thyroxine is 3, 5, 3', 5'-tetra iodothyronine. It is secreted by follicular cells of thyroid glands.

Its structure is given as



Thyroxine stimulates the consumption of oxygen and thus, the metabolism of all cells or tissues in the body.

**22** The segment of DNA which acts as the instrumental manual for the synthesis of the protein is [CBSE AIPMT 2009]

- (a) nucleotide (b) ribose  
 (c) gene (d) nucleoside

**Ans. (c)**

The segment of DNA which acts as the instrumental manual for the synthesis of the protein is gene. Every protein in a cell has a corresponding gene.

**23** Which one of the following is an amine hormone? [CBSE AIPMT 2008]

- (a) Thyroxin (b) Oxypurin  
 (c) Insulin (d) Progesterone

**Ans. (a)**

Thyroxin is an amine hormone which is secreted by thyroid gland.

**24** RNA and DNA are chiral molecules, their chirality is due to [CBSE AIPMT 2007]

- (a) L-sugar component  
 (b) chiral bases

- (c) chiral phosphate ester units  
 (d) D-sugar component

**Ans. (d)**

RNA and DNA molecules have ribose and deoxyribose sugar respectively. Both are chiral, their chirality is due to D-ribose or deoxyribose sugar components.

**25** Which one of the following vitamins is water-soluble? [CBSE AIPMT 2007]

- (a) Vitamin-B (b) Vitamin-E  
 (c) Vitamin-K (d) Vitamin-A

**Ans. (a)**

Vitamins are classified as

- (i) **Fat soluble vitamin**-A, D, E, K  
 (ii) **Water soluble vitamin**-B complex, H and C

So, vitamin-B is water soluble.

**26** Which one of the following is a peptide hormone? [CBSE AIPMT 2006]

- (a) Glucagon  
 (b) Testosterone  
 (c) Thyroxin  
 (d) Adrenaline

**Ans. (a)**

Glucagon is a peptide hormone because in it peptide linkage is present.

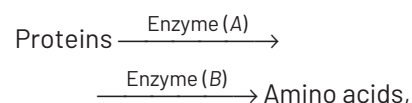
**27** The human body does not produce [CBSE AIPMT 2006]

- (a) DNA (b) vitamins  
 (c) hormones (d) enzymes

**Ans. (b)**

The organic compounds other than carbohydrates, proteins which maintain normal growth and nutrition in the human body (but not produced in human body) are called **vitamins**.

**28** During the process of digestion, the proteins present in food materials are hydrolysed to amino acids. The two enzymes involved in the process

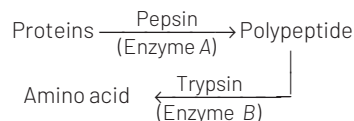


are respectively

[CBSE AIPMT 2006]

- (a) amylase and maltase  
 (b) diastase and lipase  
 (c) pepsin and trypsin  
 (d) invertase and zymase

In the process of digestion the proteins present in food material are hydrolysed to amino acid. In this process two enzymes pepsin and trypsin are involved as follows:



[CBSE AIPMT 2005]

- Ans. (b)**

**Ans.**

- Ans. (b)**

[CBSE AIPMT 2004]

- Ans. (a)**

→ Chiral (Asymmetric) carbon atom

[CBSE AIPMT 2004]

- Ans. (c)**

$$4\text{Hb} + 4\text{O}_2 \rightarrow \text{Hb}_4\text{O}_8$$

Oxy-haemoglobin

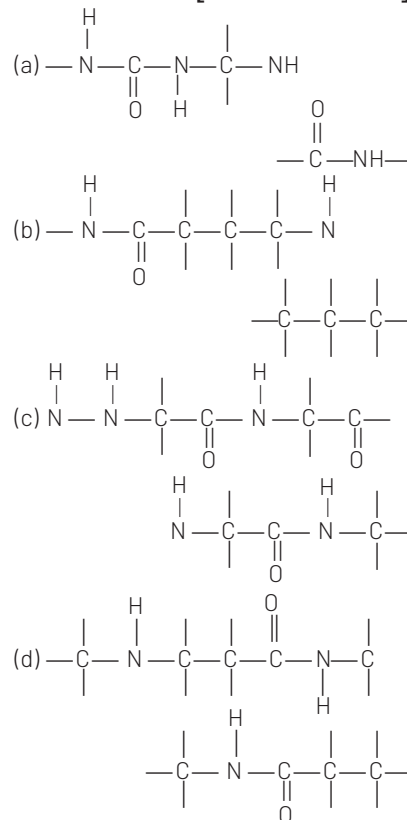
[CBSE AIPMT 2004]

- Ans. (d)**

[CBSE AIPMT 2004]

- Ans. (a)**

[CBSE AIPMT 2004]



**Ans. (c)**

$$\begin{array}{c} \text{HNH} \text{ C H} - \text{COH} \\ | \quad \quad \quad || \\ \text{R} \quad \quad \quad \text{O} \end{array} + \text{H} \cdot \text{NH} \text{ C H} - \text{C OH} \longrightarrow$$
  

$$\begin{array}{c} | \quad \quad \quad || \\ \text{R} \quad \quad \quad \text{O} \end{array}$$
  

$$\text{—HN} \text{ CH} - \text{C NH} \text{ CH} - \text{C—} \quad \text{Hence,}$$
  

$$\begin{array}{c} | \quad \quad \quad || \quad \quad \quad | \quad \quad \quad || \\ \text{R} \quad \quad \quad \text{O} \quad \quad \quad \text{R} \quad \quad \quad \text{O} \end{array}$$
$$\begin{array}{ccccccc} \text{H} & & \text{H} & & \text{H} & & \text{O} \\ | & & | & & | & & || \\ -\text{N}- & \text{C}- & \text{C}- & \text{N}- & \text{C}- & \text{C}- & \text{N}- & \text{C}- & \text{C}- \\ | & & || & & | & & || & & | \\ & & \text{O} & & & & \text{O} & & \end{array}$$

(a) amount of adenine (A) is equal to that of cytosine (C) and the amount of thymine (T) is equal to that of guanine (G)

- (b) amounts of all bases are equal  
(c) amount of adenine (A) is equal to that of thymine (T) and the amount of guanine (G) is equal to that of cytosine (C)  
(d) amount of adenine (A) is equal to that of guanine (G) and the amount of thymine (T) is equal to that of cytosine (C)

**Ans. (c)**

Chargaff's rule states that amount of adenine (A) is equal to that of the amount of thymine (T) and the amount of guanine (G) is equal to that of the amount of cytosine (C).

**38 Glycolysis is [CBSE AIPMT 2003]**

- (a) oxidation of glucose to pyruvate  
(b) conversion of glucose to haem  
(c) oxidation of glucose to glutamate  
(d) conversion of pyruvate to citrate

**Ans. (a)**

Glycolysis is the first stage in the oxidation of glucose. It is an anaerobic process and involves the degradation of glucose into two molecules of pyruvate with the generation of two molecules of ATP.

**39 Phospholipids are esters of glycerol with [CBSE AIPMT 2003]**

- (a) one carboxylic acid residue and two phosphate groups  
(b) three phosphate groups  
(c) three carboxylic acid residues  
(d) two carboxylic acid residues and one phosphate groups

**Ans. (d)**

Phospholipids are esters of glycerol with two carboxylic acid residue and one phosphate group.

Hence, phospholipids may be regarded as derivative of glycerol in which two hydroxyl groups are esterified with fatty acid, while third is esterified with phosphoric acid.

**40 Vitamin-B<sub>12</sub> contains [CBSE AIPMT 2003]**

- (a) Zn (II)  
(b) Ca (II)  
(c) Fe (II)  
(d) Co (III)

**Ans. (d)**

The molecular formula of vitamin-B<sub>12</sub> is C<sub>63</sub>H<sub>88</sub>N<sub>14</sub>O<sub>14</sub>PCo and the chemical name is cyanocobalamin. So, cobalt is present in vitamin-B<sub>12</sub>.

**41 Which is not true statement? [CBSE AIPMT 2002]**

- (a)  $\alpha$ -carbon of  $\alpha$ -amino acid is asymmetric  
(b) All proteins are found in L-form  
(c) Human body can synthesise all proteins they need  
(d) At pH = 7 both amino and carboxylic groups exist in ionised form

**Ans. (b)**

All proteins are not found in L-form but they may be present in D or L-form.

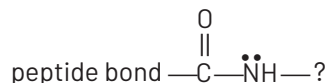
**42 Enzymes are made up of [CBSE AIPMT 2002]**

- (a) edible proteins  
(b) proteins with specific structure  
(c) nitrogen containing carbohydrates  
(d) carbohydrates

**Ans. (b)**

Enzymes are made up of proteins with specific structure and acts as a catalyst for biochemical reactions.

**43 Which statement is incorrect about**

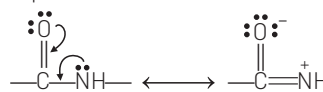


**[CBSE AIPMT 2001]**

- (a) C—N bond length in proteins is longer than usual bond length of C—N bond  
(b) Spectroscopic analysis show planar structure of  $-\text{C}-\text{NH}-$  group  
(c) C—N bond length in proteins is smaller than usual bond length of C—N bond  
(d) None of the above

**Ans. (c)**

Peptide bond is formed by the reaction of  $-\text{COOH}$  group of one amino acid with the  $-\text{NH}_2$  group of another amino acid and represented as



As partial double bond character found between C—N bond, the bond length of C—N in protein should be smaller than usual C—N bond.

**44 Which of the following is correct statement? [CBSE AIPMT 2001]**

- (a) Starch is a polymer of  $\alpha$ -glucose  
(b) Amylose is a component of cellulose  
(c) Proteins are composed of only one type of amino acid  
(d) In cyclic structure of fructose, there are four carbons and one oxygen atom

**Ans. (a)**

Starch is also known as **amylum** which occurs in all green plants. A molecule of starch  $(\text{C}_6\text{H}_{10}\text{O}_5)_n$  is built of a large number of  $\alpha$ -glucose ring joined through oxygen atom.

**45 Which of the following is correct about H-bonding in nucleotide? [CBSE AIPMT 2001]**

- (a) A—T, G—C  
(b) A—G, T—C  
(c) G—T, A—C  
(d) A—A, T—T

**Ans. (a)**

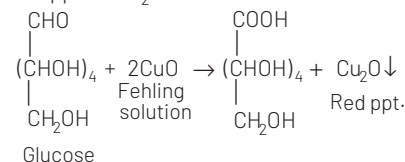
The structure of DNA molecule is a double helical structure. In this structure double helix are made up of two right handed helical polynucleotide chains which are held together by H-bonds. In these helices the adenine (A) base is linked with thymine (T) by two H-bonds and guanine (G) is linked with cytosine (C) by three H-bonds as  $\text{A}=\text{T}$ , and  $\text{G}=\text{C}$ .

**46 Which one of the following gives positive Fehling's solution test? [CBSE AIPMT 2001]**

- (a) Sucrose  
(b) Glucose  
(c) Fats  
(d) Protein

**Ans. (b)**

Glucose reduces Fehling solution to give red ppt. of  $\text{Cu}_2\text{O}$ .



**47 The hormone which controls the processes like burning of fats, proteins and carbohydrates to liberate energy in the body is [CBSE AIPMT 2000]**

- (a) cortisone  
(b) thyroxine  
(c) adrenaline  
(d) insulin

**Ans. (b)**

Thyroxine is a hormone secreted by thyroid gland. This hormone controls various biochemical reactions involving burning of proteins, carbohydrates, fats to release energy.

It is an iodinated derivative of amino acid tyrosine.

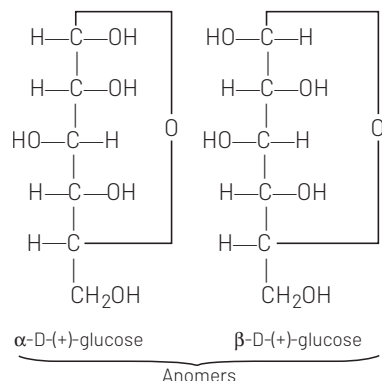
**48  $\alpha$ -D-(+)-glucose and  $\beta$ -D-(+)-glucose are [CBSE AIPMT 2000]**

- (a) anomers  
(b) epimers  
(c) enantiomers  
(d) geometrical isomers



**Ans. (a)**

Those diastereomers which differ only in configuration at C-1 are known as **anomers**



**49** Which one of the following has magnesium? [CBSE AIPMT 2000]

- (a) Vitamin-B<sub>12</sub> (b) Chlorophyll  
(c) Haemocyanin (d) Carbonic anhydrase

**Ans. (b)**

Formula of chlorophyll is C<sub>55</sub>H<sub>72</sub>MgN<sub>2</sub>O<sub>6</sub>. So Mg is present in chlorophyll. It is the green colouring matter of leaves and green stems. Vitamin-B<sub>12</sub> contains cobalt, haemocyanin contains copper and carbonic anhydrase contain zinc.

**50** Which of the following is the sweetest sugar? [CBSE AIPMT 1999]

- (a) Sucrose (b) Glucose  
(c) Fructose (d) Maltose

**Ans. (c)**

Fructose is the sweetest sugar and highly soluble in water and *slightly soluble in alcohol*. It is insoluble in ether fructose in laevorotatory hence, called **laevulose**.

**51** In DNA, the complementary bases are [CBSE AIPMT 1998, 2008]

- (a) adenine and thymine, guanine and cytosine  
(b) uracil and adenine, cytosine and guanine  
(c) adenine and guanine, thymine and cytosine  
(d) adenine and thymine, guanine and uracil

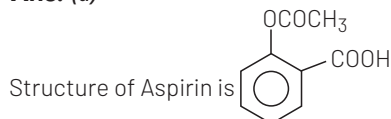
**Ans. (a)**

DNA has a double helical structure. These helix contains polynucleotide chains and these chains are held together by hydrogen bonds. In these polynucleotide chain of DNA, adenine has thymine opposite to it and guanine has cytosine opposite to it.

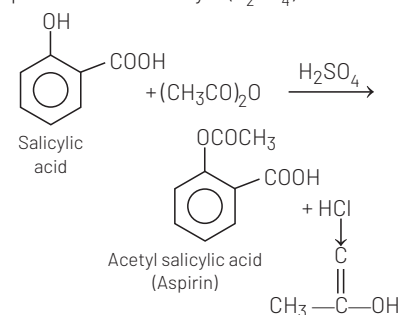
**52** Aspirin is an acetylation product of [CBSE AIPMT 1998]

- (a) *o*-hydroxybenzoic acid  
(b) *o*-hydroxybenzene  
(c) *m*-hydroxybenzoic acid  
(d) *p*-dihydroxybenzene

**Ans. (a)**



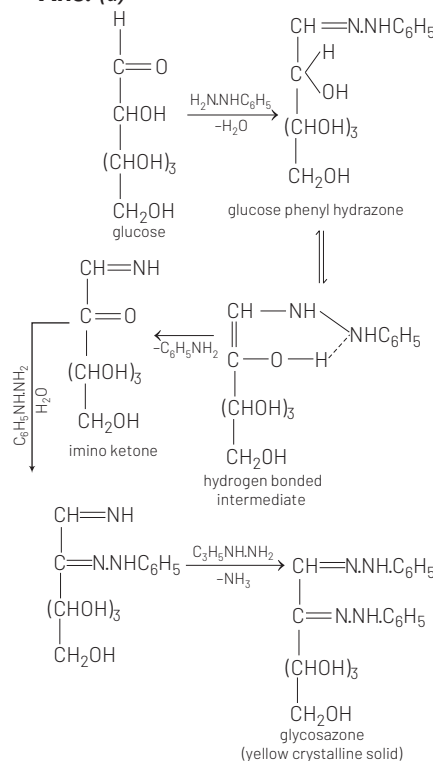
It is prepared by the reaction of acetic anhydride with salicylic acid in the presence of a catalyst (H<sub>2</sub>SO<sub>4</sub>)



**53** Glucose molecule reacts with 'X' number of molecules of phenyl hydrazine to yield osazone. The value of 'X' is [CBSE AIPMT 1998]

- (a) four (b) one (c) two (d) three

**Ans. (d)**



Thus, three phenyl hydrazine molecules and one molecule of glucose is required to form osazone.

**54** Haemoglobin is [CBSE AIPMT 1997]

- (a) an enzyme  
(b) a globular protein  
(c) a vitamin  
(d) a carbohydrate

**Ans. (b)**

Haemoglobin is a globular protein of four sub-units, it contains 94% globin.

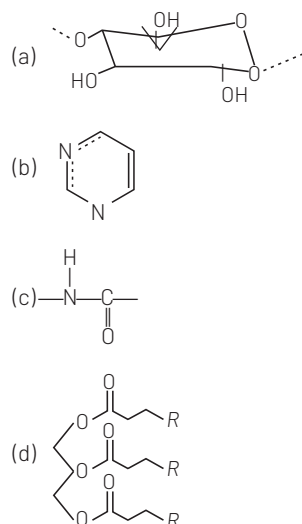
**55** The function of enzymes in the living system is to [CBSE AIPMT 1997]

- (a) transport oxygen  
(b) provide immunity  
(c) catalyse biochemical reactions  
(d) provide energy

**Ans. (c)**

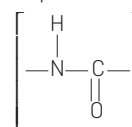
Enzymes are globular proteins which catalyse biochemical reaction in the living systems.

**56** Which one of the following chemical units is certainly to be found in enzyme? [CBSE AIPMT 1997]



**Ans. (c)**

Peptide bonds are present in enzyme because enzymes are made up of proteins, and proteins are the polymer

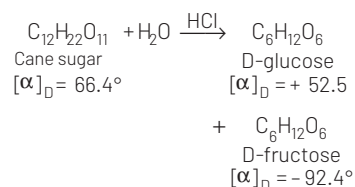


- 57** Sucrose in water is dextrorotatory,  $[\alpha]_D = +66.4^\circ$  when boiled with dil. HCl, the solution becomes laevorotatory,  $[\alpha]_D = -39.9^\circ$ . In this process the sucrose breaks into  
[CBSE AIPMT 1996]

- (a) L-glucose + D-fructose  
(b) L-glucose + L-fructose  
(c) D-glucose + D-fructose  
(d) D-glucose + L-fructose

**Ans. (c)**

The aqueous solution of sucrose is dextrorotatory having  $[\alpha]_D = +66.4^\circ$ . On hydrolysis with dilute acids or enzyme invertase, cane sugar (sucrose) gives equimolar mixture of D-(+)-glucose and D-(-)-fructose



So, sucrose is dextrorotatory but after hydrolysis gives dextrorotatory glucose and laevorotatory fructose. D-(-)-fructose has a greater specific rotation than D-(+)-glucose. Therefore, the resultant solution is laevorotatory in nature with specific rotation of  $-39.9^\circ$ .

- 58** In reference to biological role,  $\text{Ca}^{2+}$  ions are important in  
[CBSE AIPMT 1996]

- (a) triggering the contraction of muscles  
(b) generating the right electrode potential across cell membrane  
(c) hydrolysis of ATP  
(d) defence mechanism

**Ans. (b)**

The  $\text{Ca}^{2+}$  ion generates the right electrical potential across cell membrane.

- 59** Which of the following protein destroy the antigen when it enters in body cell?  
[CBSE AIPMT 1995]  
(a) Antibodies

- (b) Insulin  
(c) Chromoprotein  
(d) Phosphoprotein

**Ans. (a)**

Antibodies are the proteins which protect the body against toxic substances and infections. When an antigen enter in the body cells, the antibodies present in the body destroyed the antigen.

- 60** The  $\alpha$ -D-glucose and  $\beta$ -D-glucose differ from each other due to difference in carbon atom with respect to its  
[CBSE AIPMT 1995]

- (a) conformation  
(b) configuration  
(c) number of OH-groups  
(d) size of hemiacetal ring

**Ans. (b)**

The isomer having the hydroxyl group ( $-\text{OH}$ ) on the right is called  $\alpha$ -D-glucose and one having the hydroxyl group ( $-\text{OH}$ ) on the left is called  $\beta$ -D-glucose. Such pairs of optical isomers which differ in the configuration only around  $\text{C}_1$  atom are called anomers. Thus  $\alpha$ -D-glucose and  $\beta$ -D-glucose are anomers.

- 61** Chemically considering digestion is basically  
[CBSE AIPMT 1994]

- (a) anabolism  
(b) hydrogenation  
(c) hydrolysis  
(d) dehydrogenation

**Ans. (c)**

Digestion is basically hydrolysis reaction in which large molecules are hydrolysed to give smaller molecules. For example when we eat proteins, it will hydrolyse and form amino acids.

- 62** An example of biopolymer is  
[CBSE AIPMT 1994]

- (a) teflon  
(b) neoprene  
(c) nylon-66  
(d) DNA

**Ans. (d)**

All living cells contains nucleoproteins, i.e. substances made up of proteins

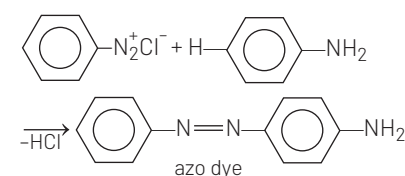
combined with biopolymers (known as nucleic acids). Nucleic acids are biologically important polymers which are present in all living cells. DNA is the polymer of nucleotides.

- 63** Diazo coupling is useful to prepare some  
[CBSE AIPMT 1994]

- (a) pesticides  
(b) dyes  
(c) proteins  
(d) vitamins

**Ans. (b)**

Diazo coupling is the reaction in which phenol, or aniline reacts with benzenediazonium salt to produce dyes with ( $-\text{N}=\text{N}-$ ) azo groups.



- 64** The couplings between base units of DNA is through  
[CBSE AIPMT 1992]

- (a) hydrogen bonding  
(b) electrostatic bonding  
(c) covalent bonding  
(d) van der Waals' forces

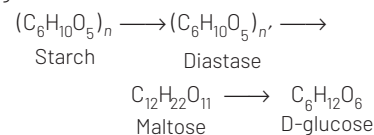
**Ans. (a)**

In DNA the two strands are held together by hydrogen bonds. For example guanine is bonded to cytosine and adenine to thymine by hydrogen bonding.

- 65** On hydrolysis of starch, we finally get  
[CBSE AIPMT 1991]  
(a) glucose  
(b) fructose  
(c) Both (a) and (b)  
(d) sucrose

**Ans. (a)**

Starch is hydrolysed with dilute acids or enzymes and break down to molecules of variable complexity and finally gives D-glucose.





## TOPIC 2

### Chemistry in Everyday Life

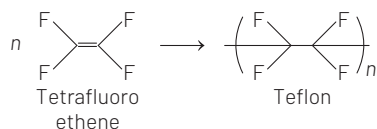
**66** Which one of the following polymers is prepared by addition polymerisation? [NEET 2021]

- (a) Teflon (b) Nylon-66  
(c) Novolac (d) Dacron

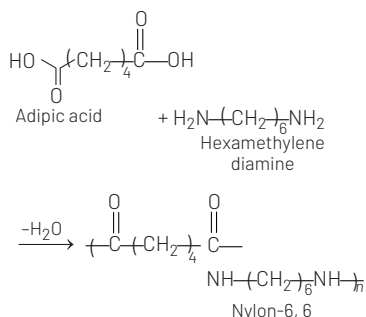
**Ans. (a)**

**Addition polymerisation** Monomers are added one after other in addition polymerisation.

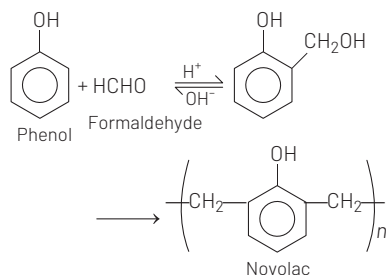
**Teflon** Addition polymerisation.



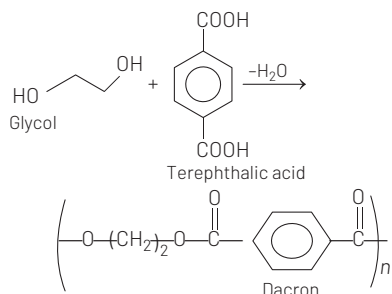
**Nylon-6, 6** Condensation polymerisation.



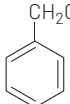
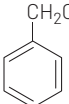
**Novolac** Condensation polymerisation.



**Dacron** Condensation polymerisation.

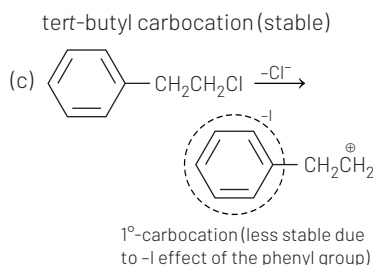
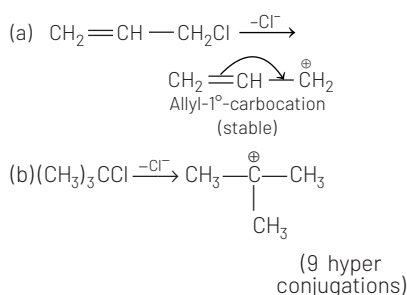


**67** Which of the following will not undergo  $\text{S}_\text{N}1$  reaction with  $\text{OH}^-$ ? [NEET (Oct.) 2020]

- (a)  $\text{CH}_2 = \text{CH} - \text{CH}_2\text{Cl}$   
(b)  $(\text{CH}_3)_3\text{CCl}$   
(c)  (d) 

**Ans. (c)**

An  $\text{S}_\text{N}1$  reaction proceeds through formation of a stable carbocation as an intermediate. Here,

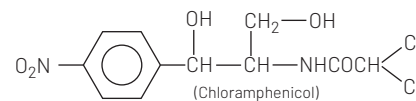


**68** Which of the following is not true about chloramphenicol? [NEET (Oct.) 2020]

- (a) It inhibits the growth of only gram-positive bacteria  
(b) It is a broad spectrum antibiotic  
(c) It is not bactericidal  
(d) It is bacteriostatic

**Ans. (a)**

Chloramphenicol is a bacteriostatic (inhibitory) broad spectrum antibiotic, which shows inhibitory effect on wide range of gram-positive and gram-negative bacteria (microbes).



Narrow-spectrum antibiotics are effective against gram-positive or gram-negative bacteria. Bactericidals show cidal or killing effect on microbes.

**69** Which of the following is a cationic detergent? [NEET (Sep.) 2020]

- (a) Sodium stearate  
(b) Cetyltrimethyl ammonium bromide  
(c) Sodium dodecyl benzene sulphonate  
(d) Sodium lauryl sulphate

**Ans. (b)**

- (a) Sodium stearate,  $\text{C}_{17}\text{H}_{35}\text{COONa}$  is a soap.  
(b) Cetyltrimethyl ammonium bromide,  $\text{CH}_3 - (\text{CH}_2)_{15} - \text{N}^+(\text{CH}_3)_3 \text{Br}^-$  is a cationic detergent.  
(c) and (d) are anionic detergents.  
Sodium dodecyl benzene sulphonate :  
 $p\text{-CH}_3(\text{CH}_2)_{11} - \text{C}_6\text{H}_4 - \text{SO}_3^-\text{Na}^+$   
Sodium lauryl sulphate:  
 $\text{CH}_3 - (\text{CH}_2)_{10} - \text{CH}_2 - \text{OSO}_3^-\text{Na}^+$

**70** Among the following, the narrow spectrum antibiotic is [NEET (National) 2019]

- (a) ampicillin  
(b) amoxycillin  
(c) chloramphenicol  
(d) penicillin G

**Ans. (d)**

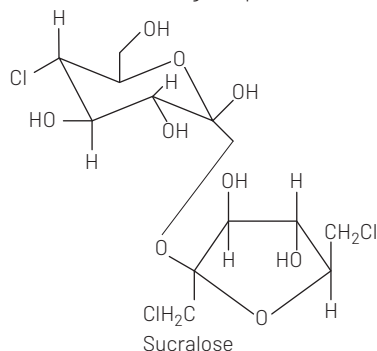
**Key Idea** Antibiotics which are effective mainly against either gram positive or gram negative bacteria are called narrow spectrum antibiotics. Penicillin G has a narrow spectrum. Ampicillin and amoxycillin are synthetic modifications of penicillin. These have broad spectrum. Also, chloramphenicol is a broad spectrum antibiotic. Hence, option (d) is correct.

**71** The artificial sweetener stable at cooking temperature and does not provide calories is [NEET (Odisha) 2019]

- (a) saccharin (b) aspartame  
(c) sucralose (d) alitame

**Ans. (c)**

Sucralose is a trichloro derivative of sucrose and is about 650 times sweeter than cane sugar. It is a zero calorie sugar and stable at cooking temperature.



**72** Mixture of chloroxylenol and terpineol acts as [NEET 2017]

- (a) analgesic (b) antiseptic  
(c) antipyretic (d) antibiotic

**Ans. (b)**

- (a) The medicines which are used to reduce pain are known as **analgesics**. For example paracetamol, ibuprofen, morphine, etc.
- (b) The chemicals which either prevent the growth of microorganisms or kill them but are not harmful to the living tissues are known as **antiseptics**. e.g. savlon, dettol. Dettol is one of the most commonly used antiseptics. It is a mixture of chloroxylenol and  $\alpha$ -terpineol.
- (c) The chemical substances which are used to bring down body temperature during fever are called **antipyretics**, e.g. aspirin, novalgin, etc.
- (d) The chemicals which are obtained from microorganisms such as bacteria, fungi, etc., or by synthetic methods and used to inhibit the growth or even kill the microorganisms are called **antibiotics**, e.g. penicillin, chloramphenicol, etc.

**73** Which of the following is an analgesic? [NEET 2016, Phase I]

- (a) Penicillin (b) Streptomycin  
(c) Chloromycetin (d) Novalgin

**Ans. (d)**

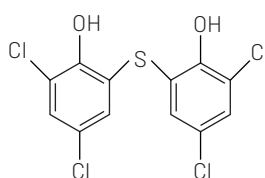
Novalgin (Dipyrone) is a non-narcotic analgesic used as pain reliever. Penicillin is an antibiotic used for curing rheumatic fever. Streptomycin is an antibiotic drug. Chloromycetin is an antibiotic drug.

**74** Bithional is generally added to the soaps as an additive to function as a/an [CBSE AIPMT 2015]

- (a) softener (b) dryer  
(c) buffering agent (d) antiseptic

**Ans. (d)**

Bithional is added to soap to impart antiseptic properties. It reduces odours produced by bacterial decomposition of organic matter on the skin.



**IUPAC Name** 2,2'-dichlorodiphenylsulfone  
(4,4'-dichlorophenol)

**75** Artificial sweetener which is stable under cold conditions only is [CBSE AIPMT 2014]

- (a) saccharine (b) sucralose  
(c) aspartame (d) alitame

**Ans. (c)**

Aspartame is the only artificial sweetener which is stable at lower temperature and decomposes at higher temperature. It is also called Nutra sweet. Its relative sweetness value is 180.

**76** Antiseptics and disinfectants either kill or prevent growth of microorganisms. Identify which of the following is not true. [NEET 2013]

- (a) A 0.2% solution of phenol is an antiseptic while 1% solution acts as a disinfectant
- (b) Chlorine and iodine are used as strong disinfectants
- (c) Dilute solutions of boric acid and hydrogen peroxide are strong antiseptics
- (d) Disinfectants harm the living tissues

**Ans. (c)**

Antiseptics and disinfectants both either kill or prevent the growth of microorganisms. The main point of difference between these two is that the former (antiseptics) are used for living beings whereas disinfectants are not safe for living tissues. These are actually used for inanimate objects like floors, tiles, etc.

A substance like phenol in its lower concentration (0.2%) behaves as antiseptic, whereas in higher

concentration (1%) as disinfectant. Chlorine and iodine are strong disinfectants whereas dilute solutions of boric acid and hydrogen peroxide are **mild** antiseptics.

**77** Which one of the following is employed as a tranquilizer drug? [CBSE AIPMT 2010]

- (a) Promethazine (b) Valium  
(c) Naproxen (d) Mifepristone

**Ans. (b)**

Tranquilizers are the chemicals that reduce anxiety and mental tension. Tranquilizer is the strain reliever also used for mild and essential component of sleeping pills. Thus, they are sometimes called **psychotherapeutic drugs**. Equanil, valium and serotonin and barbiturates (hypnotic) are some commonly used tranquilizers.

**78** Which one of the following is employed as a tranquiliser? [CBSE AIPMT 2009]

- (a) Equanil (b) Naproxen  
(c) Tetracycline (d) Chlorpheniramine

**Ans. (a)**

The drugs which are used to reduce anxiety and for the treatment of mental diseases, are called **tranquilisers**. These drugs are also known as **psychotherapeutic drugs**. Luminal, seconal and equanil are some commonly used and are the example of tranquiliser.

**79** Which of the following can possibly be used as analgesic without causing addiction and mood modification? [CBSE AIPMT 1997]

- (a) Morphine  
(b) Diazepam  
(c) Tetrahydrocannabinol  
(d) N-acetyl-*para*-aminophenol

**Ans. (d)**

N-acetyl-*para*-aminophenol or paracetamol is used as analgesic as well as antipyretic.

**80** Commonly used antiseptic 'Dettol' is a mixture of [CBSE AIPMT 1996]

- (a) *o*-chlorophenoxylenol + terpineol  
(b) *o*-cresol + terpineol  
(c) phenol + terpineol  
(d) chloroxylenol + terpineol

**Ans. (d)**

Dettol is an antiseptic. It is a mixture of chloroxylenol and terpineol in a suitable solvent.

## TOPIC 3

### Environmental Chemistry

**81** The RBC deficiency is deficiency disease of [NEET 2021]

- (a) vitamin-B<sub>12</sub> (b) vitamin-B<sub>6</sub>  
(c) vitamin-B<sub>1</sub> (d) vitamin-B<sub>2</sub>

**Ans. (a)**

Vitamin B<sub>12</sub> deficiency disease-RBC deficiency (anaemia).

Vitamin B<sub>6</sub> deficiency disease-Dermatitis, epilepsy.

Vitamin B<sub>1</sub> deficiency disease - Beri-beri

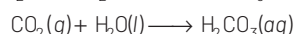
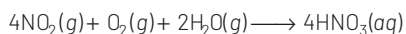
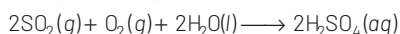
Vitamin B<sub>2</sub> deficiency disease - Ariboflavinosis.

**82** Which of the following statement is not true about acid rain? [NEET (Oct.) 2020]

- (a) It is due to reaction of SO<sub>2</sub>, NO<sub>2</sub> and CO<sub>2</sub> with rain water.  
(b) Causes no damage to monuments like Taj Mahal.  
(c) It is harmful for plants.  
(d) Its pH is less than 5.6

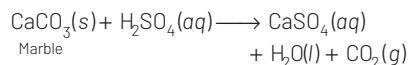
**Ans. (b)**

Air pollutants like SO<sub>2</sub>, NO<sub>2</sub> and CO<sub>2</sub> get dissolved in rain water to produce acid rain which constitutes mainly H<sub>2</sub>SO<sub>4</sub>, HNO<sub>3</sub> and H<sub>2</sub>CO<sub>3</sub>.



Due to the presence of these acids, pH of rain water drops below 5.6.

Acid rain damages marbles of Taj Mahal.



Thus, Taj Mahal gets disfigured, discoloured and lustreless.

**83** Which of the following statements is not correct about carbon monoxide? [NEET (Sep.) 2020]

- (a) It reduces oxygen carrying ability of blood.  
(b) The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin.

(c) It is produced due to incomplete combustion.

(d) It forms carboxyhaemoglobin.

**Ans. (b)**

Statements (a), (c) and (d) are correct about carbon monoxide (CO).

Statement (b) is not correct about CO, because carboxyhaemoglobin (haemoglobin bound to CO) is about 300 times more stable than oxyhaemoglobin complex.

**84** Among the following, the one that is not a green house gas is [NEET (National) 2019]

- (a) methane (b) ozone  
(c) sulphur dioxide (d) nitrous oxide

**Ans. (c)**

Sulphur dioxide (SO<sub>2</sub>) is not a green house gas. Carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), water vapour, nitrous oxide (N<sub>2</sub>O), CFCs and ozone (O<sub>3</sub>) are the green house gases. These gases are responsible for global warming.

**85** The liquified gas that is used in dry cleaning along with a suitable detergent is [NEET (Odisha) 2019]

- (a) water gas (b) petroleum gas  
(c) NO<sub>2</sub> (d) CO<sub>2</sub>

**Ans. (d)**

Solvents used to dry clean clothes are usually chlorinated compounds which are carcinogenic. Suitable detergents which work in liquid carbon dioxide have been discovered to replace the chlorinated compounds. Thus, CO<sub>2</sub> is the liquified gas that is used in dry cleaning along with a suitable detergent.

**86** Which of the following is a sink for CO? [NEET 2017]

- (a) Haemoglobin  
(b) Microorganisms present in the soil  
(c) Oceans  
(d) Plants

**Ans. (b)**

Microorganisms present in the soil act as biggest source and sink. A sink is a natural or artificial reservoir that accumulates and stores some chemical compound for an indefinite period. Thus (b) is correct option.

**87** Which one of the following is not a common component of photochemical smog?

- (a) Ozone [CBSE AIPMT 2014]  
(b) Acrolein  
(c) Peroxyacetyl nitrate  
(d) Chlorofluorocarbons

**Ans. (d)**

Among the given chlorofluorocarbons are the compounds that are responsible for the ozone depletion which degrade ozone into molecular oxygen. It is not a component of photochemical smog while other are component of smog.

**88** Which one of the following statements regarding photochemical smog is not correct? [CBSE AIPMT 2012]

- (a) Carbon monoxide does not play any role in photochemical smog formation  
(b) Photochemical smog is an oxidising agent in character  
(c) Photochemical smog is formed through photochemical reaction involving solar energy  
(d) Photochemical smog does not cause irritation in eyes and throat

**Ans. (d)**

Photochemical smog is formed in warm and sunny climate during day time by the action of sunlight on primary pollutants. It contains nitrogen oxides, ozone, PAN, etc., which are oxidising in nature. So, photochemical smog is an oxidising agent in character. It causes irritation in eyes and throat.

**89** Green chemistry means such reactions which [CBSE AIPMT 2008]

- (a) produce colour during reactions  
(b) reduce the use and production of hazardous chemicals  
(c) are related to the depletion of ozone layer  
(d) study the reactions in plants

**Ans. (b)**

Green chemistry means, the production of chemicals of our daily needs by using such reactions and chemical processes which neither use toxic chemicals, nor emit such chemicals into atmosphere. Thus, green chemistry is an alternative tool for reducing pollution.