Chapter–16

Chemistry in Everyday Life

basic concepts

1. **(*a*) Drugs:** Drugs are the chemical substances of low molecular masses (~100–500 u) which interact with macromolecular targets and produce a biological response.
   (*b*) Medicines: Drugs which produce a therapeutic and useful biological response.
   (*c*) Chemotherapy: The use of chemicals for treatment of diseases.
2. **Classification of Drugs**
   (*a*) On the basis of pharmacological effect: This classification is based on pharmacological effect of the drugs. It is useful for the doctors because it provides them the whole range of drugs available for the treatment of a particular type of problem. For example, analgesics have pain killing effect, antiseptics kill or arrest the growth of microorganisms.
   (*b*) On the basis of drug action: It is based on the action of a drug on a particular biochemical process. For example, all antihistamines inhibit the action of histamines which causes inflammation in the body.
   (*c*) On the basis of chemical structure: It is based on the chemical structure of the drug. Drugs classified in this way share common structural features and often have similar pharmacological activity. For example, sulphonamides have common structural features as seen in Fig. 16.1.

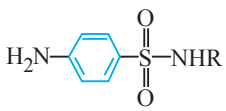


Fig. 16.1: Structural features of sulphonamides

   (*d*) On the basis of molecular targets: Drugs usually interact with biological macromolecules such as carbohydrates, proteins, lipids and nucleic acids called target molecules. This classification is based upon the type of the molecular target with which the drug interact. This is the most useful classification for medicinal chemists.
3. **Enzymes:** Proteins which perform the role of biological catalysts in the body are called enzymes.
   (*a*) Catalytic action of enzymes: In their catalytic activity, enzymes perform two major functions:
   (*i*) The first function of an enzyme is to hold the substrate for a chemical reaction. Active sites of enzymes hold the substrate molecule in a suitable position, so that it can be attacked by the reagent effectively. Substrates bind to the active site of the enzymes through a variety of interactions such as ionic bonding, hydrogen bonding, van der Waals interaction or dipole–dipole interaction.
   (*ii*) The second function of an enzyme is to provide functional groups that will attack the substrate and carry out chemical reaction.

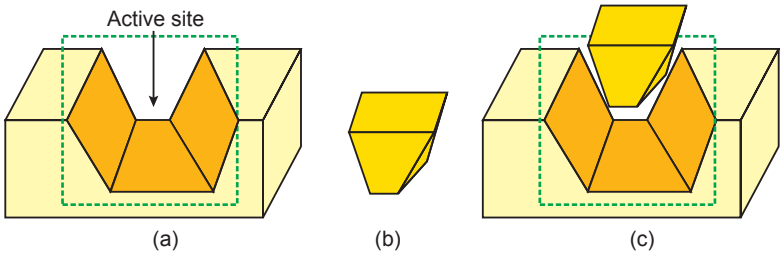


Fig. 16.2: (a) Active site of an enzyme, (b) Substrate, (c) Enzyme holding the substrate

(*b*) Drug–enzyme interaction: Drugs can block the binding site of the enzyme and prevent the binding of substrate, or can inhibit the catalytic activity of the enzyme. Such drugs are called enzyme inhibitors. Drugs inhibit the attachment of substrates on active site of enzymes in two different ways:

(*i*) Drugs compete with the natural substrate for their attachment on the active sites of enzymes. Such drugs are called competitive inhibitors.

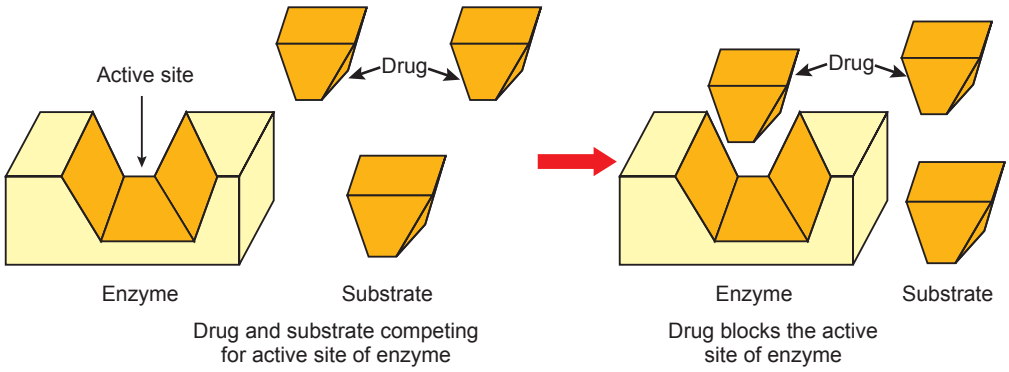


Fig. 16.3: Drug and substrate competing for active site

(*ii*) Some drugs do not bind to the enzyme's active site. These bind to a different site of enzyme which is called allosteric site. This binding of inhibitor at allosteric site changes the shape of the active site in such a way that substrate cannot recognise it.

If the bond formed between an enzyme and an inhibitor is a strong covalent bond and cannot be broken easily, then the enzyme is blocked permanently. The body then degrades the enzyme–inhibitor complex and synthesises the new enzyme.

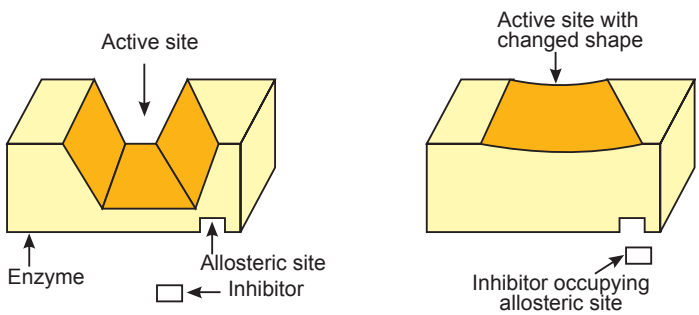


Fig. 16.4: Non-competitive inhibitor changes the active site of enzyme after binding at allosteric site

- **Receptors:** Proteins that are crucial to body's communication process are called receptors. Receptor proteins are embedded in the cell membrane in such a way that their small part possessing active site projects out of the surface of the membrane and opens on the outside region of the cell membrane.

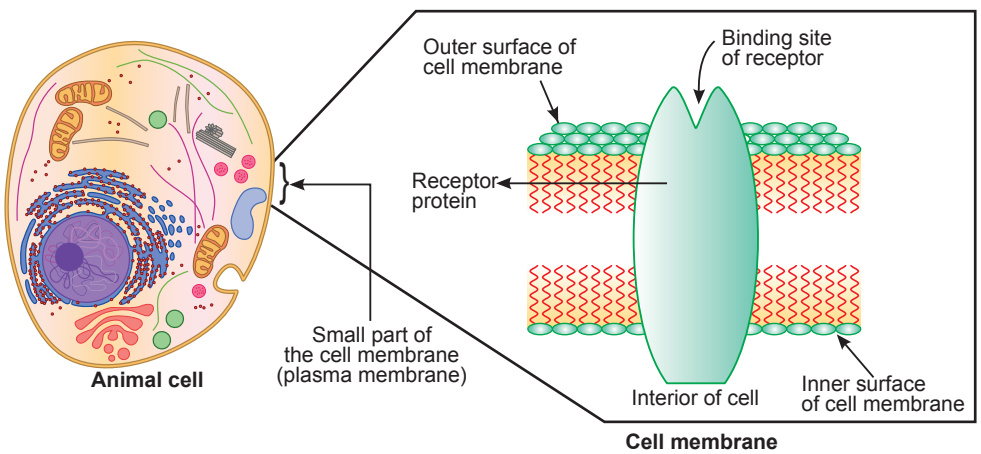


Fig. 16.5: Receptor protein embedded in the cell membrane with its active site opening on the outside region of the cell.

In the body, message between two neurons and that between neurons to muscles is communicated through certain chemicals. These chemicals, known as chemical messengers are received at the binding sites of receptor proteins. To accommodate a messenger, shape of the receptor site changes. This brings about the transfer of message into the cell. Thus, chemical messenger gives message to the cell without entering the cell.

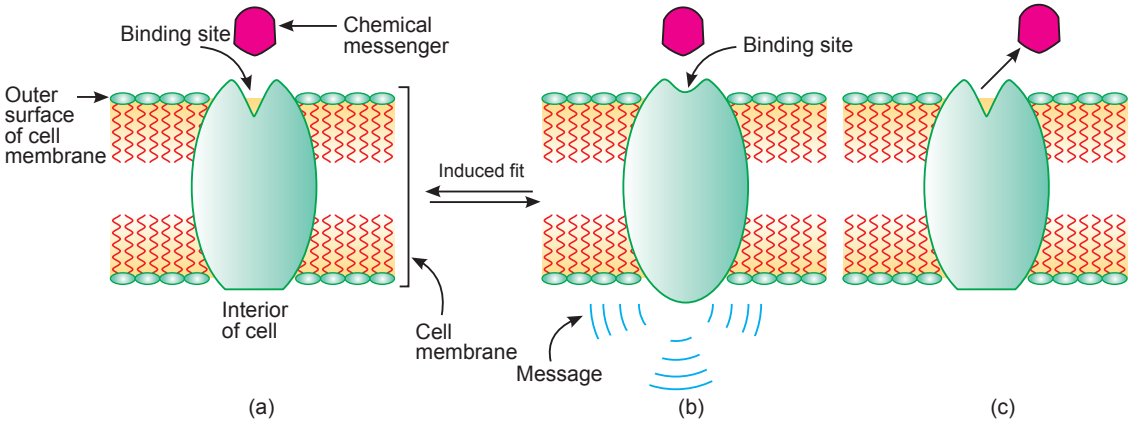


Fig. 16.6: (a) Receptor receiving chemical messenger
(b) Shape of the receptor changed after attachment of messenger
(c) Receptor regains structure after removal of chemical messenger

- **Antagonists:** Drugs that bind to the receptor site and inhibit its natural function are called antagonists. These are useful when blocking of message is required.
- **Agonists:** Drugs that mimic the natural messenger by switching on the receptor are called agonists. These are useful when there is a lack of natural chemical messenger.

4. **Antihistamines:** Antihistamines are the drugs which interfere with the natural action of histamine by competing with histamine for binding sites of receptor where histamine exerts its effects. Brompheniramine, terfenadine, pheniramine maleate (avil), cetrizine and chlorpheniramine are some examples of antihistamines.
5. **Antacids:** These are the chemical substances which remove the excess acid in the stomach and raise the pH to appropriate level, *e.g.*, sodium hydrogencarbonate, a mixture of aluminium and magnesium hydroxide, ranitidine, etc.
6. **Neurologically Active Drugs:** Analgesics and tranquilizers are neurologically active drugs. These affect the message transfer mechanism from nerve to receptor.

   (*a*) **Analgesic:** Drugs which reduce or abolish pain without causing impairment of consciousness, mental confusion, incoordination or paralysis or some other disturbances of nervous system are called analgesics. These are classified as follows:

   (*i*) **Non-narcotic analgesics:** These drugs are non-addictive. Aspirin and paracetamol are important examples of non-narcotic analgesics. These drugs are effective in relieving skeletal pain such as that due to arthritis. These drugs have many other effects such as reducing fever and preventing platelet coagulation.

   (*ii*) **Narcotic analgesics:** These are the drugs which when administered in small doses relieve pain and produce sleep. Alkaloids like morphine, codeine and heroin belong to the class of narcotic analgesics. These are chiefly used for the relief of postoperative pain, cardiac pain and pains of terminal cancer, and in child birth.

   (*b*) **Tranquilizers:** Tranquilizers are a class of chemical compounds used for the treatment of stress, fatigue, and mild or even severe mental diseases. These relieve anxiety, stress, irritability or excitement by inducing a sense of well-being.

   Examples:

   - Tranquilizers like, chlordiazepoxide and meprobamate are used for relieving tension.
   - Iproniazid and phenelzine are used as antidepressant.
   - Barbiturates, *viz.*, veronal, amytal, nembutal, luminal and seconal are hypnotic, *i.e.*, sleep producing agents.
   - Equanil is used in controlling depression and hypertension.

7. **Antimicrobial:** An antimicrobial tends to destroy or inhibit the pathogenic action of microbes such as bacteria (antibacterial drugs), fungi (antifungal drugs) or other parasites (antiparasitic drugs), selectively. Antiseptics, disinfectants and antibiotics are antimicrobial drugs.

   (*a*) **Antiseptics:** These are the chemical substances which prevent the growth of microorganisms or kill them but are not harmful to the living human tissues. Antiseptics are applied to wounds, cuts, ulcers and diseased skin surfaces. 0.2% solution of phenol, dettol (a mixture of chloroxylenol and terpineol), bithionol, tincture of iodine (2–3% solution of iodine in alcohol–water), hydrogen peroxide and boric acid solution are some of the common antiseptics.

   (*b*) **Disinfectants:** These are the chemical substances which kill microorganisms or stop their growth but are harmful to living tissues. These are used to kill the microorganisms present in floors, drains, toilets, etc. 1% of phenol, chlorine in the concentration of 0.2 to 0.4 ppm in aqueous solution and SO_2 in very low concentration act as disinfectants.

   (*c*) **Antibiotics:** These are the chemical substances produced wholly or partly by chemical synthesis, which in low concentrations inhibit the growth or destroy microorganisms by intervening in their metabolic processes. Antibiotics are of two types:

   (*i*) Bactericidal antibiotics, which have cidal (killing) effect on microbes. *e.g.*, Penicillin, aminoglycosides, ofloxacin, etc.

   (*ii*) Bacteriostatic antibiotics, which have static (inhibitory) effect on microbes. *e.g.*, erythromycin, tetracycline, chloramphenicol, etc.

   Spectrum: The full range of microorganism attacked by an antibiotic is called its spectrum. Antibiotics which kill or inhibit a wide range of Gram-positive and Gram-negative bacteria are called **broad spectrum antibiotics**. Those effective mainly against Gram-positive or Gram-negative bacteria are **narrow spectrum antibiotics**. Ampicillin, tetracycline, amoxycillin, chloramphenicol and ofloxacin are broad spectrum antibiotics. Penicillin G is a narrow spectrum antibiotic.

8. **Antifertility Drugs:** These are the chemical substances which are used to prevent unwanted pregnancies in women. For example, norethindrone, ethynylestradiol (novestrol) and mifepristone.

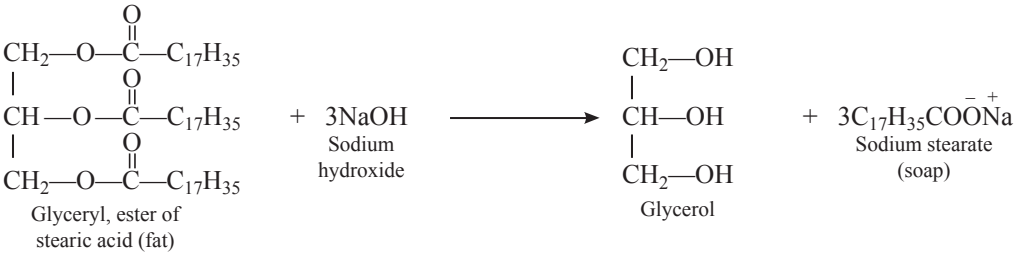
9. **Artificial Sweetening Agents:** These are the chemical compounds which are non-nutritive in nature and are used as substitutes for sugar in foods and beverages especially soft drinks. Some common artificial sweeteners are

   - **Saccharin (Ortho-sulphobenzimide):** It is useful as a sugar substitute for diabetic persons and those who need to control their calorie intake.
   - **Aspartame:** It is methyl ester of dipeptide formed from aspartic acid and phenylalanine. Aspartame is used only in cold foods and soft drinks as it is unstable at cooking temperature.
   - **Alitame:** It is a high potency sweetener. The control of sweetness of food is difficult while using alitame.
   - **Sucralose:** It is trichloroderivative of sucrose. It is stable at cooking temperature.

10. **Food Preservatives:** These are the chemical substances which are added to the food materials to prevent their spoilage due to microbial growth. The most commonly used preservative include table salt, vegetable oil, sugar, potassium metabisulphite and sodium benzoate.

11. **Antioxidants in Food:** Antioxidants are important and necessary food additives that help in food preservation by retarding the action of oxygen on food. These are more reactive towards oxygen than the food material they are protecting. For example, butylated hydroxy toluene (BHT) and butylated hydroxy anisole (BHA). BHA is added to butter to increase its shelf-life.

12. **Soaps:** Soaps are sodium or potassium salts of long chain fatty acids. Soaps containing sodium salts are formed by heating fat (*i.e.*, glyceryl ester of fatty acid) with aqueous sodium hydroxide solution. This reaction is known as **saponification**.



In this reaction, esters of fatty acids are hydrolysed and the soap is obtained in the colloidal form. It is precipitated from the solution by adding sodium chloride. The solution left after removing the soap contains glycerol, which can be recovered by fractional distillation. Soap is a good cleansing agent and is biodegradable. Soaps have two disadvantages:

- Soaps cannot be used in hard water as calcium and magnesium ions present in hard water form insoluble calcium and magnesium soaps, respectively.

$$\underset{\text{Soluble sodium stearate (Soap)}}{2C_{17}H_{35}\overset{-}{C}OO\overset{+}{N}a} + CaCl_2 \longrightarrow 2NaCl + \underset{\text{Insoluble calcium stearate}}{(C_{17}H_{35}COO)_2Ca}$$

  The insoluble soaps separate as scum in the water and hence a part of soap is wasted. In fact, this scum creates hindrance to washing because the precipitates of these soaps adhere onto fibres of the cloth as gummy mass.

- Soap cannot be used in acidic solutions as acid present in the solution precipitate the insoluble free fatty acids which adhere onto the fabrics and thus decreases the ability of soaps to remove oil from fabrics.

13. Synthetic Detergents: These are the cleansing agents which have all properties of soaps, but actually do not contain any soap. These can be used both in soft and hard water as they give foam even in hard water. Synthetic detergents are of three types, namely anionic, cationic and non-ionic.

(*i*) Anionic detergents: These are so named because large part of their molecules are anions and it is the anionic part of the molecule which is involved in the cleansing action. These are sodium salt of sulphonated long chain alcohols or hydrocarbons. For example, sodium lauryl sulphate, sodium dodecylbenzene sulphonate, etc. Anionic detergents are used in household work and in toothpastes.

(*ii*) Cationic detergents: These are so called because large part of their molecules are cations and it is the cationic part of the molecule which is involved in the cleansing action. Cationic detergents are quaternary ammonium salts of amines with acetates, chlorides or bromides as anions. Cetyltrimethyl ammonium bromide is a cationic detergent and used in hair conditioners. Cationic detergents have germicidal properties and are expensive, therefore, these are of limited use.

(*iii*) Non-ionic detergents: Non-ionic detergents do not contain any ion. These are esters of high molecular mass alcohols. One such detergent is formed when stearic acid reacts with polyethyleneglycol. Liquid dishwashing detergents are non-ionic type.

- The problem in the use of detergents is that if their hydrocarbon chain is highly branched then bacteria cannot degrade them easily. Slow degradation of detergents leads to their accumulation and this causes water pollution. Unbranched chain can be biodegraded more easily and hence pollution is prevented.

NCERT Textbook Questions

NCERT Intext Questions

Q. 1. Sleeping pills are recommended by doctors to the patients suffering from sleeplessness but it is not advisable to take its doses without consultation with the doctor. Why?

Ans. Most of the drugs taken in doses higher than recommended may cause harmful effects and act as poison. Therefore, a doctor should always be consulted before taking the medicine.

Q. 2. With reference to which classification has the statement, 'ranitidine is an antacid' been given?

Ans. This statement refers to the classification of drugs according to pharmacological effect because any drug which will be used to counteract the effect of excess acid in the stomach will be called an antacid.

Q. 3 Why do we require artificial sweetening agents?

Ans. (*i*) To control intake of calories.

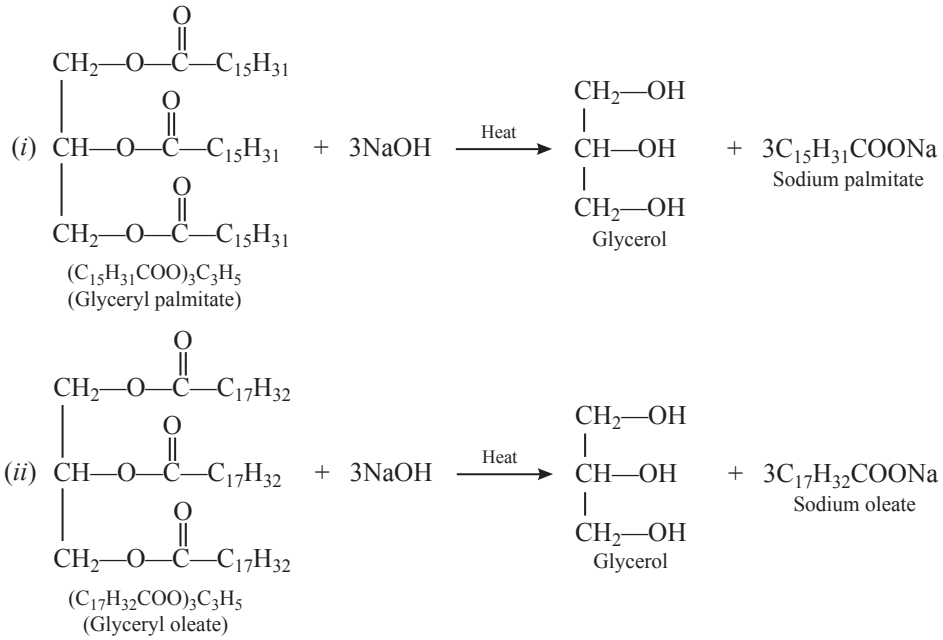
(*ii*) As a substitute of sugar for diabetics.

Q. 4. Write the chemical equation for preparing sodium soap from glyceryl oleate and glyceryl palmitate. Structural formulae of these compounds are given below:

(*i*) $(C_{15}H_{31}COO)_3C_3H_5$ —Glyceryl palmitate

(*ii*) $(C_{17}H_{32}COO)_3C_3H_5$ —Glyceryl oleate

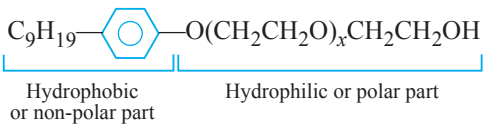
Ans.



Q. 5. Following type of non-ionic detergents are present in liquid detergents, emulsifying agents and wetting agents. Label the hydrophilic and hydrophobic parts in the molecule. Identify the functional group(s) present in the molecule. ***[HOTS]***

C_9H_{19}—C$_6$H$_4$—$O(CH_2CH_2O)_xCH_2CH_2OH$ (x = 5 to 10)

Ans.



Functional groups present in the molecule are:

(*i*) ether (*ii*) alcohol.

NCERT Textbook Exercises

Q. 1. Why do we need to classify drugs in different ways?

Ans. Various methods of classification of drugs and the usefulness of such classification are as follows:

- Classification on the basis of pharmacological effect is useful for doctors because it provides them the whole range of drugs available for the treatment of a particular type of problem.
- Classification on the basis of drug action on a particular biochemical process is useful for choosing the correct lead compound for designing the synthesis of a desired drug.
- Classification on the basis of molecular targets is useful for medicinal chemists so that they can design a drug which is most effective for a particular receptor site.
- Classification on the basis of chemical structure helps us to design the synthesis of a number of structurally similar compounds having different substituents and then choosing the drug having the least toxicity.

Q. 2. Explain the term, target molecules or drug targets as used in medicinal chemistry.

Ans. Drugs interact with macromolecules such as proteins, carbohydrates, lipids and nucleic acids. Hence, these are called **drug targets**. These drug targets perform various functions in the body. For example, Proteins

perform several roles in the body. Proteins which act as biological catalysts are called enzymes, those which are crucial in communication system are called receptors. Carrier proteins carry polar molecules across the cell membrane. Nucleic acids have coded genetic information in the cell, and carbohydrates and lipids form the structural part of cell membranes.

Q. 3. Name the macromolecules which are chosen as drug targets.
[CBSE Delhi 2014; CBSE Sample Paper 2016]

Ans. Macromolecules such as nucleic acids, proteins, carbohydrates and lipids are called drug targets.

Q. 4. Why should not medicines be taken without consulting the doctors?

Ans. Side effects are caused when a drug binds to more than one receptor site. So, a doctor must be consulted to choose the right drug which has the maximum affinity for a particular receptor site to have the desired effect. The dose of the drug is also crucial because some drugs like opiates in higher doses act as poisons and may cause death.

Q. 5. Define the term chemotherapy.

Ans. The branch of chemistry which deals with the treatment of diseases using chemicals is called chemotherapy.

Q. 6. Which forces are involved in holding the drugs to the active site of enzymes?

Ans. Ionic bonding, hydrogen bonding, dipole–dipole interactions or van der Waals interactions.

Q. 7. While antacids and antiallergic drugs interfere with the function of histamines, why do these not interfere with the function of each other?

Ans. Drugs designed to cure some ailment in one organ in the body do not affect the other because they work on different receptors. For example, secretion of histamine causes allergy. Also, it causes acidity due to release of hydrochloric acid in the stomach. As antiallergic and antacid drugs work on different receptors so, antihistamines remove allergy while antacids remove acidity.

Q. 8. Low level of noradrenaline is the cause of depression. What type of drugs are needed to cure this problem? Name two drugs.

Ans. In event of low level of neurotransmitter, noradrenaline, antidepressant drugs are required. These drugs inhibit the enzymes which catalyse the degradation of noradrenaline. If the enzyme is inhibited, noradrenaline is slowly metabolised and thus activates its receptor for longer periods of time thereby reducing depression. Two important drugs are iproniazid and phenelzine.

Q. 9. What is meant by the term 'broad spectrum antibiotics'? Explain. ***[CBSE (F) 2009]***

Ans. Broad spectrum antibiotics are effective against several different types of harmful bacteria. Examples are tetracycline, ofloxacin, chloramphenicol, etc. Chloramphenicol can be used in case of typhoid, acute fever, dysentry, urinary infections, meningitis and pneumonia.

Q. 10. How do antiseptics differ from disinfectants? Give one example of each. ***[CBSE Delhi 2009; (AI) 2012]***

Ans. Differences between antiseptics and disinfectants:

Antiseptics

- Antiseptics are chemical substances which prevent the growth of microorganisms and may even kill them but are not harmful to living tissues.
- Antiseptics are generally applied to living tissues such as wounds, cuts, ulcers and diseased skin surfaces.
- Dettol, furacine, soframicine are antiseptics.

Disinfectants

- Disinfectants are chemical substances which kill microorganisms or stop their growth but are harmful to human tissues.
- Disinfectants are applied to inanimate objects such as floor, drainage system, instrument, etc.

Chlorine in the concentration of 0.2 to 0.4 ppm in aqueous solution and SO_2 in very low concentration are disinfectants.

Q. 11. Why are cimetidine and ranitidine better antacids than sodium hydrogen carbonate or magnesium or aluminium hydroxide? ***[HOTS]***

Ans. $NaHCO_3$ or $Mg(OH)_2$ or $Al(OH)_3$, if taken in excess, makes the stomach alkaline and thus triggers the release of even more HCl which may cause ulcers in the stomach. On the other hand, cimetidine and ranitidine prevent the interaction of histamine with the receptor cells in the stomach wall and thus release lesser amount of HCl, hence are better antacids.

Q. 12. Name a substance which can be used as an antiseptic as well as disinfectant.
[*CBSE Delhi 2008, CBSE Sample Paper 2016; CBSE 2020 (56/5/1)*]

Ans. 0.2% solution of phenol acts as an antiseptic while 1% of the solution acts as a disinfectant.

Q. 13. What are the main constituents of dettol?

Ans. Chloroxylenol and α-terpineol in a suitable solvent.

Q. 14. What is tincture of iodine? What is its use?

Ans. A 2-3 per cent solution of iodine in alcohol-water mixture is known as tincture of iodine. It is used as an antiseptic.

Q. 15. What are food preservatives?

Ans. Chemical substances which are used to protect food against bacteria, yeasts and moulds are called preservatives. For example, sodium metabisulphite, sodium benzoate, etc.

Q. 16. Why is use of aspartame limited to cold foods and drinks? **[*CBSE (F) 2012, 2014*]**

Ans. Use of aspartame is limited to cold foods because it is unstable at cooking temperature.

Q. 17. What are artificial sweetening agents? Give two examples.

Ans. Artificial sweeteners are chemical substances which are sweet in taste but do not add any calories to our body. For example, saccharin, aspartame, sucralose, etc.

Q. 18. Name the sweetening agent used in the preparation of sweets for a diabetic patient.
[*CBSE Delhi 2014*]

Ans. Saccharin.

Q. 19. What problem arises in using alitame as artificial sweetener?

Ans. Alitame is a high potency artificial sweetener. Therefore, the control of sweetness of food is difficult while using it.

Q. 20. How are synthetic detergents better than soaps?

Ans. Detergents can be used both in soft and hard water as they produce foam even in hard water. The reason being that sulphonic acids and their calcium and magnesium salts are soluble in hard water but the fatty acids and their calcium and magnesium salts are insoluble.

Q. 21. Explain the following terms with suitable examples:
(*i*) Cationic detergents
(*ii*) Anionic detergents
(*iii*) Non-ionic detergents

Ans. Refer to Basic Concepts Point 13.

Q. 22. What are biodegradable and non-biodegradable detergents? Give one example of each.
[*CBSE (F) 2012*]

Ans. Detergents having straight hydrocarbon chains are easily degraded by microorganisms and hence are called biodegradable detergents, whereas detergents containing branched hydrocarbon chains are not easily degraded by the microorganisms and hence are called non-biodegradable detergents. As a result, non-biodegradable detergents accumulate in rivers and waterways thereby causing severe water pollution.

Examples of biodegradable detergents are: sodium lauryl sulphate, sodium 4-(1-dodecyl) benzene-sulphonate and sodium 4-(2-dodecyl) benzenesulphonate. An example of non-biodegradable detergent is sodium 4-(1, 3, 5, 7-tetramethyloctyl) benzenesulphonate.

Q. 23. Why do soaps not work in hard water?

Ans. Hard water contains calcium and magnesium salts. In hard water, soap gets precipitated as calcium and magnesium soap which being insoluble stick to the clothes as gummy mass. Therefore soaps do not work in hard water.

Q. 24. Can you use soaps and synthetic detergents to check the hardness of water?

Ans. Hard water contains calcium and magnesium ions. Soaps get precipitated as insoluble calcium and magnesium soaps in hard water but detergents do not. Synthetic detergents produce foam both in soft and hard water. Thus, soaps but not synthetic detergents can be used to check the hardness of water.

Q. 25. Explain the cleansing action of soaps. ***[CBSE (AI) 2012]***

Ans. The cleansing action of soap is due to the fact that soap molecules, such as sodium stearate form micelle around the oil droplet in such a way that hydrophobic part of the stearate ions is in the oil droplet and hydrophilic part projects out of the oil droplet like the bristles (Fig. 16.7). Since the polar groups can interact with water, the oil droplet surrounded by stearate ions is now pulled in water and removed from the dirty surface. Thus, soap helps in emulsification and washing away of oils and fats. The negatively charged sheath around the globules prevents them from coming together and forming aggregates.

Fig. 16.7 (i) Oil or grease on cloth (ii) Stearate ions arranging around the oil droplet and (iii) Oil droplet surrounded by stearate ions (micelle formed).

Q. 26. If water contains dissolved calcium hydrogen carbonate, out of soaps and synthetic detergents, which one will you use for cleaning clothes?

Ans. Calcium bicarbonate makes water hard. Therefore, soap cannot be used as it gets precipitated in hard water. In contrast, a synthetic detergent does not precipitate in hard water because its calcium salt is also soluble in water. Hence, synthetic detergents can be used for cleaning clothes in hard water.

Q. 27. Label the hydrophilic and hydrophobic parts in the following compounds:

(*i*) $CH_3(CH_2)_{10}CH_2\overset{-}{O}\overset{+}{S}O_3Na$

(*ii*) $CH_3(CH_2)_{15}-\overset{+}{N}(CH_3)_3Br^-$

(*iii*) $CH_3(CH_2)_{16}COO(CH_2CH_2O)_nCH_2CH_2OH$

Ans. (*i*) $\underset{\text{Hydrophobic part}}{CH_3(CH_2)_{10}CH_2} - \underset{\text{Hydrophilic part}}{\overset{-}{O}\overset{+}{S}O_3Na}$

(*ii*) $\underset{\text{Hydrophobic part}}{CH_3(CH_2)_{15}} - \underset{\text{Hydrophilic part}}{\overset{+}{N}(CH_3)_3\,Br^-}$

(*iii*) $\underset{\text{Hydrophobic part}}{CH_3(CH_2)_{16}} - \underbrace{COO(CH_2CH_2O)_nCH_2CH_2OH}_{\text{Hydrophilic part}}$

Multiple Choice Questions [1 mark]

Choose and write the correct option(s) in the following questions.

1. The most useful classification of drugs for medicinal chemists is _____. ***[NCERT Exemplar]***

(*a*) on the basis of chemical structure. (*b*) on the basis of drug action.

(*c*) on the basis of molecular targets. (*d*) on the basis of pharmacological effect.

2. Which of the following is not a target molecule for drug function in body? ***[NCERT Exemplar]***

(*a*) Carbohydrates (*b*) Lipids

(*c*) Vitamins (*d*) Proteins

3. Which of the following statements is not true about enzyme inhibitors? ***[NCERT Exemplar]***

(*a*) Inhibit the catalytic activity of the enzyme.

(*b*) Prevent the binding of substrate.

(*c*) Generally a strong covalent bond is formed between an inhibitor and an enzyme.

(*d*) Inhibitors can be competitive or non-competitive.

4. Which of the following statements are incorrect about receptor proteins? [*NCERT Exemplar*]

(*a*) Majority of receptor proteins are embedded in the cell membranes.

(*b*) The active site of receptor proteins opens on the inside region of the cell.

(*c*) Chemical messengers are received at the binding sites of receptor proteins.

(*d*) Shape of receptor doesn't change during attachment of messenger.

5. Drugs which are useful when blocking of message is required are known as

(*a*) antagonists (*b*) agonists (*c*) antacids (*d*) antihistamines

6. Which of the following statements is correct about narcotic analgesics?

(*a*) They prevent platelet coagulation. (*b*) They prevent fever.

(*c*) They relieve pain and produce sleep. (*d*) They prevent heartattack.

7. The compound that causes general antidepressant action on the central nervous system belongs to the class of _____ . [*NCERT Exemplar*]

(*a*) analgesics (*b*) tranquilizers (*c*) narcotic analgesics (*d*) antihistamines

8. Which of the following statements is correct? [*NCERT Exemplar*]

(*a*) Some tranquilisers function by inhibiting the enzymes which catalyse the degradation of noradrenaline.

(*b*) Tranquilisers are narcotic drugs.

(*c*) Tranquilisers are chemical compounds that do not affect the message transfer from nerve to receptor.

(*d*) Tranquilisers are chemical compounds that can relieve pain and fever.

9. Which statement about aspirin is not true? [*NCERT Exemplar*]

(*a*) Aspirin belongs to narcotic analgesics. (*b*) It is effective in relieving pain.

(*c*) It has antiblood clotting action. (*d*) It is a neurologically active drug.

10. Salvarsan is arsenic containing drug which was first used for the treatment of _____ [*NCERT Exemplar*]

(*a*) syphilis (*b*) typhoid (*c*) meningitis (*d*) dysentry

11. Which among of the following is not an antibiotic?

(*a*) Penicillin (*b*) Oxytocin (*c*) Tetracycline (*d*) Erythromycin

12. A narrow spectrum antibiotic is active against _____ . [*NCERT Exemplar*]

(*a*) gram positive or gram negative bacteria. (*b*) gram negative bacteria only.

(*c*) single organism or one disease. (*d*) both gram positive and gram negative bacteria.

13. Compound which is added to soap to impart antiseptic properties is _____ . [*NCERT Exemplar*]

(*a*) sodium laurylsulphate (*b*) sodium dodecylbenzenesulphonate

(*c*) rosin (*d*) bithional

14. Which of the following types of soap contain a gum called rosin?

(*a*) Toilet soaps (*b*) Medicated soaps (*c*) Transparent soaps (*d*) Shaving soaps

15. Which of the following statements is not correct? [*NCERT Exemplar*]

(*a*) Some antiseptics can be added to soaps.

(*b*) Dilute solutions of some disinfectants can be used as antiseptic.

(*c*) Disinfectants are antimicrobial drugs.

(*d*) Antiseptic medicines can be ingested.

16. Which is the correct statement about birth control pills? [*NCERT Exemplar*]

(*a*) Contain estrogen only.

(*b*) Contain progesterone only.

(*c*) Contain a mixture of estrogen and progesterone derivatives.

(*d*) Progesterone enhances ovulation.

17. Which of the following is used as a "morning after pill"?

(*a*) Norethindrone (*b*) Bithional

(*c*) Mifepristone (*d*) Ethynylestradiol

18. Which of the following will not enhance nutritional value of food?

(*a*) Minerals (*b*) Artificial sweeteners (*c*) Vitamins (*d*) Amino acids

19. Alitame is more stable than aspartame still it is not widely used because

(*a*) it is unstable at cooking temperature (*b*) it is a high potency sweetener

(*c*) it excretes from the body in urine as such (*d*) all of these

20. Which of the following are not used as food preservatives? [*NCERT Exemplar*]

(*a*) Table salt (*b*) Sodium hydrogencarbonate

(*c*) Cane sugar (*d*) Benzoic acid

21. Which of the following enhances leathering property of soap? [*NCERT Exemplar*]

(*a*) Sodium carbonate (*b*) Sodium rosinate

(*c*) Sodium stearate (*d*) Trisodium phosphate

22. Glycerol is added to soap. It functions _____ . [*NCERT Exemplar*]

(*a*) as a filler (*b*) to increase leathering

(*c*) to prevent rapid drying (*d*) to make soap granules.

23. Polyethyleneglycols are used in the preparation of which type of detergents? [*NCERT Exemplar*]

(*a*) Cationic detergents (*b*) Anionic detergents

(*c*) Non-ionic detergents (*d*) Soaps

24. Which of the following is an example of liquid dishwashing detergent? [*NCERT Exemplar*]

(*a*) $CH_3(CH_2)_{10}—CH_2OSO_3^-Na^+$

(*b*) C_9H_{19}—C$_6$H$_4$—O—$(CH_2—CH_2—O)_5$—CH_2CH_2OH

(*c*) CH_3—C$_6$H$_4$—$SO_3^-Na^+$

(*d*) $\left[CH_3(CH_2)_{15}—\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{N}}}}—CH_3\right]^+ Br^-$

Answers

1. (*c*)	**2.** (*c*)	**3.** (*c*)	**4.** (*b, d*)	**5.** (*a*)	**6.** (*c*)	**7.** (*b*)	**8.** (*a*)	**9.** (*a*)	**10.** (*a*)
11. (*b*)	**12.** (*a*)	**13.** (*d*)	**14.** (*d*)	**15.** (*d*)	**16.** (*c*)	**17.** (*c*)	**18.** (*b*)	**19.** (*b*)	**20.** (*b*)
21. (*b*)	**22.** (*c*)	**23.** (*c*)	**24.** (*b*)						

Assertion-Reason Questions

In the following questions, two statements are given—one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

(*a*) ***Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).***

(*b*) ***Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).***

(*c*) ***Assertion (A) is correct, but Reason (R) is incorrect statement.***

(*d*) ***Assertion (A) is incorrect, but Reason (R) is correct statement.***

1. Assertion (*A*) : Enzymes have active sites that hold substrate molecule for a chemical reaction.

Reason (*R*) : Drugs compete with natural substrate by attaching covalently to the active site, of enzyme.

2. **Assertion (*A*) :** Competitive inhibitors compete with natural substrate for their attachment on the active sites of enzymes.
   Reason (*R*) : In competitive inhibition, inhibitor binds to the allosteric site of the enzyme.
3. **Assertion (*A*) :** Non-competitive inhibitor inhibits the catalyic activity of enzyme by binding with its active site.
   Reason (*R*) : Non-competitive inhibitor changes the shape of the active site in such a way that substrate can't recognise it.
4. **Assertion (*A*) :** Receptors are crucial to body's communication process.
   Reason (*R*) : Receptors are proteins.
5. **Assertion (*A*) :** Chemical messenger gives message to the cell without entering the cell.
   Reason (*R*) : Chemical messenger is received at the binding site of receptor proteins.
6. **Assertion (*A*) :** Chemical messengers are chemicals that enable communication of message between two neurons or between neurons and muscles.
   Reason (*R*) : Chemicals enter the cell through receptor.
7. **Assertion (*A*) :** Metal hydroxides are better antacids than metal hydrogencarbonates.
   Reason (*R*) : Metal hydroxides being insoluble do not increase the pH of the stomach above neutrality.
8. **Assertion (*A*) :** Terfenadine, an antihistamine does not affect the secretion of acid in stomach.
   Reason (*R*) : Antiallergic and antacid drugs work on different receptors.
9. **Assertion (*A*) :** Sulpha drug contain sulphonamide group.
   Reason (*R*) : Salvarsan is a sulpha drug.
10. **Assertion (*A*) :** Penicillin (G) is an antibiotic.
    Reason (*R*) : Penicillin (G) is effective against gram positive as well as gram negative bacteria.
11. **Assertion (*A*) :** Sodium chloride is added to precipitate soap after saponification.
    Reason (*R*) : Hydrolysis of esters of long chain fatty acids by alkali produces soaps in colloidal form.
12. **Assertion (*A*) :** Transparent soaps are made by dissolving soaps in ethanol.
    Reason (*R*) : Ethanol makes things invisible.

Answers

1. (*c*) **2.** (*c*) **3.** (*d*) **4.** (*b*) **5.** (*a*) **6.** (*c*) **7.** (*a*) **8.** (*a*) **9.** (*c*) **10.** (*c*)
11. (*a*) **12.** (*c*)

Passage-based/Case-based Questions

Read the given passages and answer the questions that follow.

PASSAGE–1

An antimicrobial tends to destroy or inhibit the pathogenic action of microbes such as bacteria (antibacterial drugs), fungi (antifungal drugs) or other parasites (antiparasitic drugs), selectively. Antiseptics, disinfectants and antibiotics are antimicrobial drugs. Antiseptics and disinfectants are the chemicals which either kill or prevent the growth of microorganisms. Antiseptics are applied to the living tissues such as wounds, cuts, ulcers and diseased skin surfaces. Examples are furacine, soframycin, etc. These are not ingested like antibiotics. Bithionol (the compound is also called bithional) is added to soaps to impart antiseptic properties. Iodine is a powerful antiseptic. It is applied on to wounds. Iodoform is also used as an antiseptic for wounds. Boric acid in dilute aqueous solution is weak antiseptic for eyes. Disinfectants are applied to inanimate objects such as oors, drainage system, instruments, etc. some substances can act as an antiseptic as well as disinfectant by varying the concentration. Antibiotics are the chemical substances produced wholly or partly by chemical synthesis, which in low concentrations inhibit the growth or destroy microorganisms by intervening in their metabolic process.

1. Give an example of a substance that can act as a disinfectant as well as antiseptic depending upon its concentration. (Specify concentration)

Ans. The 0.2% solution of phenol acts as an antiseptic whereas the 1% solution of phenol acts as disinfectant.

2. Name the chemicals responsible for the antiseptic properties of dettol.

Ans. Chloroxylenol and terpineol

3. What is meant by 'narrow spectrum antibiotics'?

Ans. Antibiotics which are mainly effective against Gram-positive or Gram-negative bacteria are known as narrow spectrum antibiotics, *e.g.*, penicillin G.

4. Give the name of one broad spectrum antibiotic.

Ans. Tetracycline

5. Which one of the following drugs is an antibiotic:

Morphine, Equanil, Chloramphenicol, Aspirin ***[CBSE (F) 2014]***

Ans. Chloramphenicol

PASSAGE–2

Synthetic detergents are cleansing agents which have all the properties of soaps, but which actually do not contain any soap. These can be used both in soft and hard water as they give foam even in hard water. Some of the detergents give foam even in ice cold water. Synthetic detergents are mainly classified into three categories: 1. Anionic detergents, 2. Cationic detergents and 3. Non-ionic detergents. Anionic detergents are sodium salts of sulphonated long chain alcohols or hydrocarbons. Alkyl hydrogen sulphates formed by treating long chain alcohols with concentrated sulphuric acid are neutralized with alkali to form anionic detergents. Similarly, alkyl benzene sulphonates are obtained by neutralizing alkyl benzene sulphonic acids with alkali. Cationic detergents are quaternary ammonium salts of amines with acetates, chlorides or bromides as anions. Cationic part possess a long hydrocarbon chain and a positive charge on nitrogen atom. Hence, these are called cationic detergents. Non-ionic detergents do not contain any ions in their constitution.

1. Give an example of an alkylbenzenesulphonate detergent.

Ans. Sodium 4-(2-dodecyl) benzenesulphonate

2. What is the chemical composition of cationic detergents?

Ans. Mostly acetates or chlorides of quaternary amines.

3. The cleansing action of synthetic detergents is not affected by hard water. Mention the reason for the same.

Ans. The anions of synthetic detergents do not precipitate in the presence of Ca^{2+} and Mg^{2+} ions.

4. Why are detergents preferred over soaps?

Ans. Unlike soaps, detergents can be used even in hard water because like sodium salts, calcium and magnesium salts of sulphonic acids are soluble in water.

5. Give one example of non-biodegradable detergents.

Ans. An example of non-biodegradable detergent is sodium 4-(1, 3, 5, 7-tetramethyloctyl) benezenesulphonate.

Very Short Answer Questions [1 mark]

Q. 1. Which site of an enzyme is called allosteric site? ***[NCERT Exemplar]***

Ans. Sites different from active site of enzyme where a molecule can bind and affect the active site is called allosteric site. Some drugs may also bind at this site.

Q. 2. Where are receptors located? ***[NCERT Exemplar]***

Ans. Receptors are embedded in cell membrane.

Q. 3. Name two types of chemical messengers.

Ans. Neurotransmitters and hormones.

Q. 4. What is the nature of an antacid?

Ans. Substances which reduce the release of excess HCl by preventing the interaction of histamine with the receptors present in the stomach wall are called antacids. The most commonly used antacids are cimetidine and ranitidine.

Q. 5. Name an antacid which prevents the formation of acid in the stomach.

Ans. Cimetidine or ranitidine.

Q. 6. What is the harmful effect of hyperacidity? [*NCERT Exemplar*]

Ans. It can cause ulcer in stomach.

Q. 7. Between sodium hydrogencarbonate and magnesium hydroxide which is a better antacid and why? [*NCERT Exemplar*] [*HOTS*]

Ans. Magnesium hydroxide is a better antacid because being insoluble it does not allow the pH to increase above neutral. Hydrogencarbonate being soluble, its excess can make the stomach alkaline and trigger the production of even more acid.

Q. 8. Define antihistamines with an example. [*CBSE (F) 2014*]

Ans. The drugs which interfere with the natural action of histamine by competing with histamine for binding of receptor where histamine exerts its effect are called antihistamine *e.g.*, brompheniramine, terfenadine, cetirizine etc.

Q. 9. How do the drugs like brompheniramine and terfenadine (seldane) act as antihistamines? [*HOTS*]

Ans. They interfere with the natural action of histamine by competing with histamine for binding sites of receptor where histamine exerts its effect.

Q. 10. Aspirin is pain relieving antipyretic drug but can be used to prevent heart attack. Explain. [*NCERT Exemplar*] [*HOTS*]

Ans. Aspirin prevents platelet coagulation and thus has antiblood clotting action. Therefore, it can prevent blood clotting in heart.

Q. 11. Name two narcotics which are used as analgesics.

Ans. Morphine and codeine are used as analgesics.

Q. 12. Mention the pharmacological effect of most sulphonamides.

Ans. Sulphonamides are antibacterial.

Q. 13. Name an artificial sweetener which is derivative of sucrose. [*NCERT Exemplar*]

Ans. Sucralose.

Q. 14. What is aspartame and what is its use?

Ans. It is the methyl ester of the dipeptide derived from phenylalanine and aspartic acid. It is used as an artificial sweetener.

Q. 15. Name two α-amino acids which form a dipeptide which is 100 times more sweet than cane sugar. [*NCERT Exemplar*]

Ans. Aspartic acid and phenylalanine.

Q. 16. How are transparent soaps manufactured? [*NCERT Exemplar*]

Ans. Dissolving soap in ethanol followed by evaporating the excess solvent.

Q. 17. Why is glycerol added to shaving soaps?

Ans. Glycerol is added to shaving soaps to prevent rapid drying.

Short Answer Questions–I [2 marks]

Q. 1. Which site of an enzyme is called allosteric site? Explain its role in enzyme inhibition.

Ans. Site different from active site of an enzyme where a drug molecule can bind is called allosteric site. Binding of drug at the allosteric site changes the shape of the active site in such a way that natural substrate cannot recognise it. Because of this, the chemical change is inhibited.

Q. 2. What is the scientific explanation for the feeling of depression? [*NCERT Exemplar*]

Ans. A person suffers from depression when he has low levels of noradrenaline. Noradrenaline is a neurotransmitter that plays a role in mood changes. Low levels of noradrenaline lower the signal sending activity and make the person suffer from depression.

Q. 3. Give one important use each of the following in Pharmacy.

(*i*) Equanil **(*ii*) Morphine.**

Ans. (*i*) Equanil is a tranquilizer. It is used for removing depression and hypertension.

(*ii*) Morphine is an alkaloid. It is used as an analgesic.

Q. 4. List two major classes of antibiotics with examples of each class.

Ans. Two major classes of antibiotics are: Bactericidal and Bacteriostatic. Examples are:

(*i*) Bactericidal	**(*ii*) Bacteriostatic**
(*a*) Penicillin	(*a*) Erythromycin
(*b*) Aminoglycosides	(*b*) Tetracycline
(*c*) Ofloxacin	(*c*) Chloramphenicol

The full range of microorganisms attacked by an antibiotic is called its spectrum. Based on spectrum, antibiotics can be divided in two classes: (*a*) Broad spectrum antibiotics *e.g.*, chloramphenicol (*b*) Narrow spectrum antibiotics *e.g.*, penicillin G.

Q. 5. Answer the following questions:

(*i*) How do tranquilizers and analgesics work?

(*ii*) How does the branching of hydrocarbon chain of synthetic detergents affect their biodegradability? ***[NCERT Exemplar]***

Ans. (*i*) Tranquilizers and analgesics work by altering the message transfer mechanism from nerve to receptor.

(*ii*) Less branching leads to easy biodegradability.

Short Answer Questions–II [3 marks]

Q. 1. (*i*) Which one of the following is a disinfectant?

0.2% solution of phenol or 1% solution of phenol

(*ii*) What is the difference between agonists and antagonists?

(*iii*) Write one example each of

(*a*) Artificial sweetener **(*b*) Antacids** ***[CBSE 2019 (56/3/2)]***

Ans. (*i*) 1% solution of phenol.

(*ii*) Agonists are the drugs that mimic the natural messenger by switching on the receptor whereas antagonists are the drugs which bind to the receptor site and inhibit its natural function.

(*iii*) (*a*) Saccharin, sucralose, etc.

(*b*) Sodium hydrogen carbonate, a mixture of aluminium and magnesium hydroxide, ranitidine.

Q. 2. What are the following substances? Give one example of each one of them:

(*i*) Tranquilizers **(*ii*) Food preservatives**

(*iii*) Synthetic detergents ***[CBSE Delhi 2012, 2020 (56/5/3)]***

Ans. (*i*) Tranquilizers are a class of chemical compounds used for the treatment of stress, fatigue, and mild or even severe mental diseases. These relieve anxiety, stress, irritability or excitement by inducing a sense of well-being, *e.g.*, iproniazid, chlordiazepoxide, equanil, luminal, etc.

(*ii*) Food preservatives are the chemical substances which are added to food materials to prevent their spoilage due to microbial growth and to retain their nutritive value for long periods. Preservatives prevent the rancidity of food and inhibit growth or kill the microorganisms. The most common preservatives used are sugar, vegetable oil, sodium benzoate, salts of ascorbic acid and propanoic acid.

(*iii*) Synthetic detergents are cleansing agents, which have all the properties of soaps but actually do not contain any soap. These can be used in both soft water and hard water as they produce foam even in hard water. These are mainly classified into three categories:

- Anionic detergents, *e.g.*, sodium dodecylbenzene sulphonate
- Cationic detergents, *e.g.*, cetyltrimethyl ammonium bromide
- Non-ionic detergents, *e.g.*, polyethylene glycol stearate

Q. 3. Differentiate between the following:

(*i*) Antiseptics and Disinfectants

(*ii*) Antacids and Antihistamines

(*iii*) Soaps and Detergents ***[CBSE 2019 (56/5/2), 2020 (56/5/1)]***

Ans. (*i*) Refer to NCERT Textbook Questions, Q. 10.

(*ii*) Antacids are chemical substances which neutralize stomach acidity while antihistamines are drugs which treat allergies.

(*iii*) Soaps do not work in hard water while detergents work in hard water.

Q. 4. Define the following terms with a suitable example of each:

(*i*) Antiseptics

(*ii*) Bactericidal antibiotics

(*iii*) Cationic detergents ***[CBSE 2019 (56/3/2), 2020 (56/3/3), 2020 (56/5/3)]***

Ans. (*i*) Antiseptics are the chemical substances which prevent the growth of microorganisms or may even kill them but are not harmful to living human tissues, *e.g.*, dettol, soframycin, boric acid, hydrogen peroxide, etc.

(*ii*) Bactericidal antibiotics are those antibiotics which have cidal (killing) effect on microbes, *e.g.*, penicillin, ofloxacin, etc.

(*iii*) Cationic detergents are quaternary ammonium salts of amines with acetates, chlorides or bromides as anions *e.g.*, cetyltrimethyl ammonium bromide.

Q. 5. (*i*) Pick out the odd one from the following on the basis of their medicinal properties:

Equanil, Seconal, Bithional, Luminal

(*ii*) What type of detergents are used in dishwashing liquids?

(*iii*) Why is the use of aspartame limited to cold foods? ***[CBSE 2019 (56/2/1)]***

Ans. (*i*) Bithional is an antiseptic while the remaining three are tranquilizers.

(*ii*) Non-ionic detergents.

(*iii*) The use of aspartame is limited to cold foods because it is unstable at cooking temperature.

Q. 6. (*i*) What are antidepressant drugs? Give an example.

(*ii*) Name the sweetening agent used in preparation of sweets for a diabetic patient.

(*iii*) Why are detergents non-biodegradable? ***[CBSE 2019 (56/4/3)]***

Ans. (*i*) Antidepressant drugs are the tranquilizers which inhibit the enzymes that catalyse the degradation of noradrenaline, an important neurotransmitter, *e.g.*, iproniazid, phenelzine.

(*ii*) Saccharin.

(*iii*) If the hydrocarbon chain of detergent is highly branched then the side chain stop bacteria from attacking and breaking the chain. This makes it non-biodegradable.

Long Answer Question [5 marks]

Q. 1. (*i*) (*a*) Why is bithional added to soap? ***[CBSE Paper 2018]***

(*b*) What is tincture of iodine? Write its one use.

(*c*) Among the following, which one acts as a food preservative?

Aspartame, Aspirin, Sodium Benzoate, Paracetamol

(*ii*) Give reasons for the following:

(*a*) Sulpha drugs work like antibiotics but they are not antibiotics.

(*b*) Soaps are biodegradable whereas detergents are non-biodegradable.

Ans. (*i*) (*a*) Bithional acts as an antiseptic agent and reduces the odour produced by bacterial decomposition of organic matter on the skin.

(*b*) Refer to NCERT Textbook Exercises, Q. 14.

(*c*) Sodium benzoate

(*ii*) (*a*) This is because sulpha drugs are purely synthetic while antibiotics may be either wholly or partially obtained from microorganisms.

(*b*) Soap molecules have straight hydrocarbon chains which are easily degraded by bacteria present in the sewage water. On the other hand, detergent molecules have branched hydrocarbon chains which are either not attacked or slowly attacked by bacteria present in sewage water.

Self-Assessment Test

Time allowed: 1 hour **Max. marks: 30**

Choose and write the correct answer for each of the following. (3 × 1 = 3)

1. **Chloroquine is an effective drug for**

   (*a*) pain (*b*) fever

   (*c*) malaria (*d*) pneumonia

2. **Aspirin acts as**

   (*a*) analgesic (*b*) antipyretic

   (*c*) antimalarial (*d*) both antipyretic and analgesic

3. **The medicines which lowers the body temperature are known as**

   (*a*) analgesic (*b*) antipyretic

   (*c*) antibiotic (*d*) pheromones

In the following questions, two statements are given—one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

(*a*) *Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).*

(*b*) *Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).*

(*c*) *Assertion (A) is correct, but Reason (R) is incorrect statement.*

(*d*) *Assertion (A) is incorrect, but Reason (R) is correct statement.* (3 × 1 = 3)

4. **Assertion (*A*) :** Receptor proteins show selectivity for one chemical messenger over the other.

   Reason (*R*) : Chemical messenger binds to the receptor site and inhibits its natural function.

5. **Assertion (*A*) :** All chemicals added to food items are called food preservatives.

   Reason (*R*) : All these chemicals increase the shelf life of stored food.

6. **Assertion (*A*) :** Preservative are added to food items.

   Reason (*R*) : Preservatives inhibit the growth of microorganisms.

Answer the following questions:

7. What is an antipyretic. Give an example. (1)
8. What is the mode of action of antimicrobial drugs? (1)
9. Why are certain drugs called enzyme inhibitors? (2)
10. What are the functions performed by histamine in the body? (2)
11. What is the advantage of using antihistamines over antacids in the treatment of acidity? (2)

12. How do antidepressant drugs counteract feeling of depression? **(2)**

13. If soap has high alkali content it irritates skin. How can the amount of excess alkali be determined? What can be the source of excess alkali? **(2)**

14. Answer the following questions:

(*i*) Which class of drugs is used in sleeping pills?

(*ii*) What is the commonality between the antibiotic arsphenamine and azodye?

(*iii*) Pickles have a long shelf-life and do not get spoiled for months. Why? **(3)**

15. Answer the following questions:

(*i*) Name the antibiotic used specifically for treatment of typhoid fever.

(*ii*) What is the medicinal use of Narcotic drugs? ***[NCERT Exemplar]***

(*iii*) Which category of the synthetic detergents is used in toothpaste? **(3)**

16. Explain the following terms giving one example of each type:

(*i*) Antiseptics

(*ii*) Antibiotics

(*iii*) Anionic detergents ***[CBSE 2019 (56/2/1)]*** **(3)**

17. Answer the following questions:

(*i*) Pick out the odd one from among the following on the basis of their medicinal properties mentioning the reason: Luminal, Seconal, Phenacetin, Equanil.

(*ii*) What are pathogens?

(*iii*) Name any two macromolecules chosen as drug targets. **(3)**

Answers

1. (*c*) **2.** (*d*) **3.** (*b*) **4.** (*c*) **5.** (*d*) **6.** (*a*)