

16 ■■■ Chemistry in Everyday Life

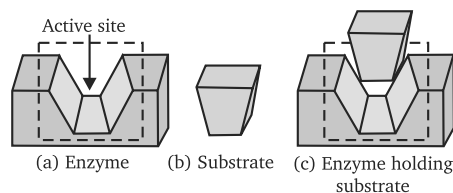
Facts that Matter

- **Drugs:** Drugs are chemicals of low molecular mass, which interact with macromolecular targets and produce a biological response.
- **Chemotherapy:** The use of chemicals to cure illness/ailments is called chemotherapy.
- **Classifications of Drugs**
 - (i) *On the Basis of Pharmacological Effects:* Drugs for a particular type of problem. *E.g.* analgesics for relieving pain.
 - (ii) *On the Basis of Drug Action:* Action of drug on a particular biological process.
 - (iii) *On the Basis of Chemical Action:* Drugs having similar structure. *E.g.* sulpha drugs.
 - (iv) *On the Basis of Molecular Targets:* Drugs interacting with biomolecules as lipids and proteins.

- **Enzymes as Drug Targets**

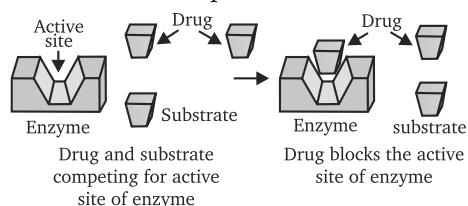
- (i) *Catalytic Action of Enzymes:*

- (a) Enzymes have active sites which holds the substrate molecules. It can be attracted by reacting molecules.
 - (b) Substrate is bonded to active sites through hydrogen bond, ionic bond, van der Waals or dipole-dipole interactions.

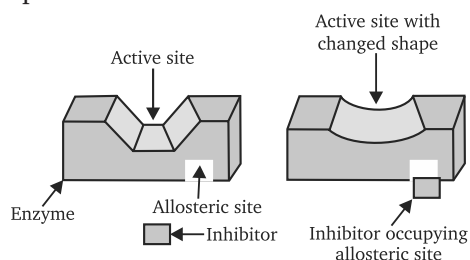


- (ii) *Drug Enzyme Interactions:*

- (a) Drug compete with natural substrate for their attachment on the active sites of enzymes. They are called competitive inhibitors.

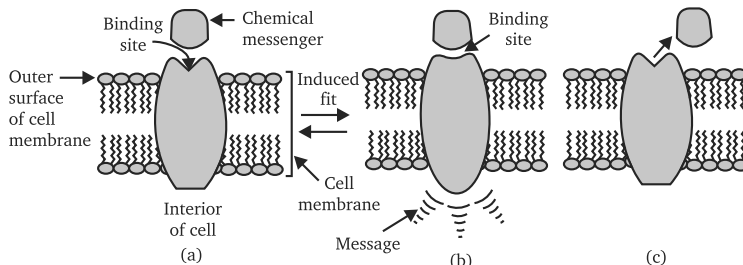


- (b) Some drugs bind to a different site of the enzyme called allosteric site which changes the shape of active site.



- **Receptors as Drug Targets:**

Receptors are proteins that are crucial to body's communication process. In the body, message 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 receptors sites are changed.

There are a large number of receptors in the body that interact with different chemical messengers, hence one medicine is not suitable for different type of diseases.

- **Antagonists:** The drugs that bind to the receptor site and inhibit its natural functions.
- **Agonists:** Drugs that mimic the natural messenger by switching on the receptor.
- **Antacids:** These are the compounds which neutralise the excess acid of stomach. *E.g.*, aluminium hydroxide and magnesium hydroxide.
- **Antihistamines:** The drugs which interfere with the natural action of histamines and prevent the allergic reaction. *E.g.* ranitidine, tagamet and avil.
- **Tranquilizers:** The class of chemical compounds used for treatment of stress, mild or even severe mental diseases. *E.g.*, luminal, seconal, equanil and iproniazid.
- **Analgesics:** They reduce pain without causing impairment of consciousness, mental confusion or some other disturbance of the nervous system. *E.g.* **Aspirin:** used as an anti-pyretic as well as an analgesic. It prevents platelet coagulation, because of its anti-blood clotting action aspirin finds use in prevention of heart attacks. Other examples are saridon and phenacitin.
- **Antimicrobials:** They tend to prevent/destroy or inhibit the pathogenic action of microbes such as bacteria, virus, fungi, etc. They are classified as—
 - (i) **Antibiotics:** These are chemical substances which are produced by micro-organisms and are used to kill the pathogenic micro-organisms. *E.g.* penicillin and ofloxacin.
 - (a) **Narrow Spectrum Antibiotics:** These are effective mainly against gram positive or gram negative bacteria. *E.g.* penicillin, streptomycin.
 - (b) **Broad Spectrum Antibiotics:** They kill or inhibit a wide range of micro-organisms. *E.g.* chloramphenicol and tetracycline.
 - (ii) **Antiseptics or Disinfectants:** These are the ones which either kill/inhibit the growth of micro-organisms. Antiseptic is applied to the living tissues such as wounds, cuts, ulcers, etc. *E.g.* furacine, chloroxylenol and terpineol (Dettol). Disinfectant is applied to inanimate objects such as floors, drainage system. *E.g.* 0.2% solution of phenol is an antiseptic while 1% solution is a disinfectant.
- **Antifertility Drugs:** These are the chemical substances used to control pregnancy. They are also called contraceptives or birth control pills. *E.g.* mifepristone and norethindrone.
- **Artificial sweetning Agents:** These are the chemical compounds which give sweetening effect to the food without adding calories. These are good for the diabetic patients. *E.g.* aspartame, saccharin, alitame and sucrolose.
- **Food Preservatives:** They prevent the spoilage of food due to microbial growth. *E.g.* salt, sugar, sodium benzoate, BHT and BHA.

- **Cleansing Agents:**

- (i) **Soaps:** They are sodium or potassium salts of long chain fatty acids. They are obtained by the saponification reaction, where fatty acids are heated with aqueous sodium hydroxide. They do not work well in hard water. They are biodegradable.
- (ii) **Synthetic Detergents:** They are cleaning agents having properties of soaps, but actually contains no soap. They can be used both in soft as well as hard water. They are classified as
 - (a) **Anionic Detergents:** They are sodium salts of sulphonated long chain alcohols or hydrocarbons. *E.g.* Sodium lauryl sulphonate. Its anionic part is responsible for the cleansing action.
 - (b) **Cationic Detergents:** They are quaternary ammonium salts of amines with acetates, chlorides or bromides. They are expensive and are used to a limited extent. *E.g.* cetyltrimethyl ammonium-bromide. Its cationic part is responsible for the cleansing action.
 - (c) **Non-ionic Detergents:** They do not contain any ions. Some liquid dish-washing detergents are of non-ionic type.
- **Biodegradable Detergents:** The detergents which are linear or less branched and can be attacked by micro-organisms are called biodegradable detergents. *E.g.* Sodium-4-(1-dodecyl) benzene/sulphonate.
- **Non-biodegradable Detergents:** The detergents which are highly branched and cannot be decomposed by micro-organisms are called non-biodegradable detergents. It creates water pollution.

NCERT IN-TEXT QUESTIONS SOLVED

16.1. 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 dose higher than recommended may produce harmful effects and acts as a poison which can even cause death. That is why before taking the drug consultation of doctor is necessary.

16.2. With reference to which classification has the statement, “ranitidine is an antacid” been given?

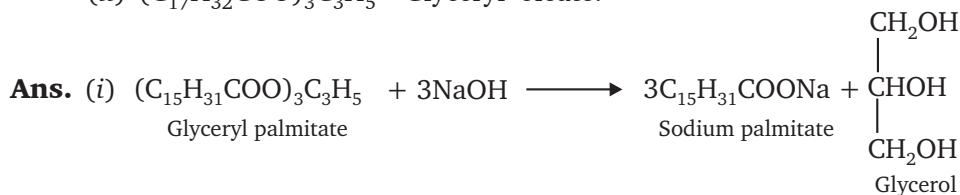
Ans. This statement refers to the classification of drugs according to the pharmacological effect because any drug which will be used to neutralise the excess acid present in the stomach will be called an antacid.

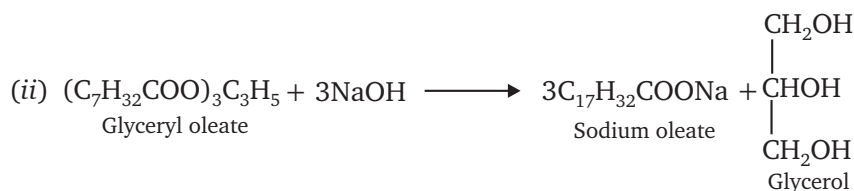
16.3. Why do we require artificial sweetening agents?

Ans. To reduce the calorie intake and to protect teeth from decaying, we need artificial sweetening agents.

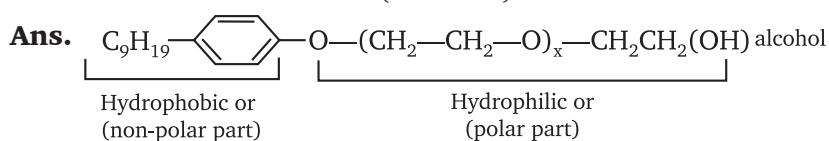
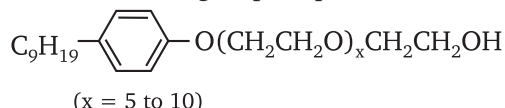
16.4. Write the chemical equation for preparing sodium soap from glyceryl oleate and glyceryl palmitate. Structural formulae of these compounds are given below:

- (i) $(C_{15}H_{31}COO)_3C_3H_5$ —Glyceryl palmitate.
- (ii) $(C_{17}H_{33}COO)_3C_3H_5$ —Glyceryl oleate.





16.5. 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.



NCERT TEXTBOOK QUESTIONS SOLVED

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

Ans. To understand its action on our body we must classify the drugs. It is useful for doctors because it provides them the whole range of drugs available for the treatment of a particular disease.

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

Ans. Target molecules or drug-targets are the macromolecules such as carbohydrates, proteins, lipids and nucleic acids with which the drugs are designed to interact as specific targets so that these have the least chances of affecting other target molecules.

16.3. Name the macromolecules that are chosen as drug targets.

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

16.4. Why should not medicines be taken without consulting doctors?

Ans. Side effects are caused when a drug binds to more than one receptor site. Therefore, a doctor must be consulted to choose the right drug which has the maximum effects for a particular receptor site to have the desired effect and not the harmful effect.

16.5. Define the term chemotherapy.

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

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

Ans. Hydrogen bonding, Ionic bonding, Dipole-dipole interactions or van der Waals' interactions.

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

Ans. Antiallergic and antacids drugs work on different receptors, as antihistamines remove allergy while antacids remove acidity. Therefore, they do not interfere with the functioning of each other.

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

Ans. If the level of noradrenaline is low for some reason, the signal-sending activity becomes low and the person suffers from depression. In such situations anti-depressant drugs are required.

‘Iproniazid and phenelzine’ are two such drugs, as these drugs inhibit the enzymes which catalyse the degradation of noradrenaline.

16.9. What is meant by the term ‘broad spectrum antibiotics’? Explain. [Delhi 2017]

Ans. Broad spectrum antibiotics are effective against several different types of harmful bacteria. For example, tetracycline, chloramphenicol, ofloxacin, etc.

16.10. How do antiseptics differ from disinfectants? Give one example of each.

Ans. Antiseptics are chemical substances which prevent the growth of micro-organisms and may even kill them but are not harmful to human or animal tissues. For example, Dettol and Savlon.

Disinfectants are chemical substances which kill micro-organisms but are not safe to be applied to the living tissues. These are generally used to kill micro-organisms present in the drains, toilets, floors, etc.

16.11. Why are cimetidine and ranitidine better antacids than sodium hydrogencarbonate or magnesium or aluminium hydroxide?

Ans. Sodium hydrogencarbonate or magnesium or aluminium hydroxide neutralises the excess HCl and raise the pH to an appropriate level in stomach. Therefore, these antacids controls only the symptoms and not the cause. In contrast, cimetidine and ranitidine are better antacids because they prevent the interaction of histamine with the receptors present in the stomach wall and thus releases lesser amount of HCl.

16.12. Name a substance which can be used as an antiseptic as well as disinfectant.

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

16.13. What are main constituents of dettol?

Ans. Chloroxylenol and terpineol.

16.14. What is tincture of iodine? What is its use?

Ans. 2–3% solution of iodine in alcohol and water is called tincture of iodine. It is a powerful antiseptic. It is applied on wounds.

16.15. What are food preservatives? [AI 2014]

Ans. Food preservatives prevent spoilage of food due to microbial growth. The most commonly used preservatives include table salt, sugar, vegetable oils and sodium benzoate.

16.16. Why is use of aspartame limited to cold foods and drinks?

Ans. Aspartame decomposes at baking or cooking temperatures and hence can be used only in cold foods and drinks.

16.17. What are artificial sweetening agents? Give two examples.

Ans. Any artificial sweetener such as saccharin, aspartame are used as used as sweetening agents. These are the chemical substances which are sweet in taste but do not add any calories to our body.

16.18. Name the sweetening agent used in the preparation of sweets for a diabetic patient.

Ans. Any artificial sweetner such as saccharin, aspartame or alitame may be added.

16.19. What problem arises in using alitame as artificial sweetener?

Ans. Alitame is a high potency artificial sweetener. Therefore, it is difficult to control the sweetness of food to which it is added.

16.20. How are synthetic detergents better than soaps?

Ans. Synthetic detergents can be used in hard water as well as in acidic solution. Because sulphuric acid and their calcium and magnesium salts are soluble in water but the fatty acids and their calcium and magnesium salts are insoluble.

16.21. Explain the following terms with suitable examples:

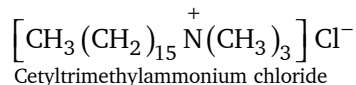
(i) cationic detergents

(ii) anionic detergents

[AI 2017]

(iii) non-ionic detergents

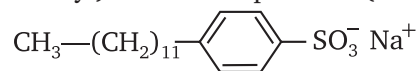
Ans. (i) **Cationic detergents:** These are quaternary ammonium salts. For example, cetyltrimethyl ammonium chloride.



(ii) **Anionic detergents.** These are so called because a large part of their molecules are anions. These are of two types:

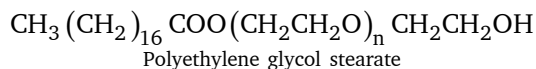
(a) *Sodium alkylsulphates:* For example, sodium laurylsulphate, $\text{C}_{11}\text{H}_{23}\text{CH}_2\text{OSO}_3\text{Na}$.

(b) *Sodium alkylbenzenesulphonates:* The most widely used domestic detergent is sodium 4-(1-dodecyl) benzenesulphonate (SDS).



Sodium 4-(1-dodecyl) benzenesulphonate

(iii) **Neutral or Non-ionic detergents.** These are esters of high molecular mass alcohols with fatty acids. For example, polyethylene glycol stearate.



16.22. What are biodegradable and non-biodegradable detergents? Give one example of each.

Ans. Biodegradable Detergents: Detergents having straight hydrocarbon chains are easily degraded by micro-organisms and hence are called biodegradable detergents. Example—Sodium laurylsulphate.

Non-biodegradable detergents. Detergents containing branched hydrocarbon chains are not easily degraded by the micro-organisms and hence are called non-biodegradable detergents. Example—sodium 4-(1, 3, 5, 7-tetramethyloctyl) benzene sulphonate.

16.23. Why do soaps not work in hard water?

Ans. Hard water contains calcium and magnesium salts. Therefore in hard water soaps get precipitated as calcium and magnesium salts which being insoluble sticks to the cloth as a gummy mass.

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

Ans. Soaps can be used to check the hardness of water as they form insoluble precipitate with hard water. But synthetic detergents cannot be used to check the hardness of water.

16.25. Explain the cleansing action of soaps.

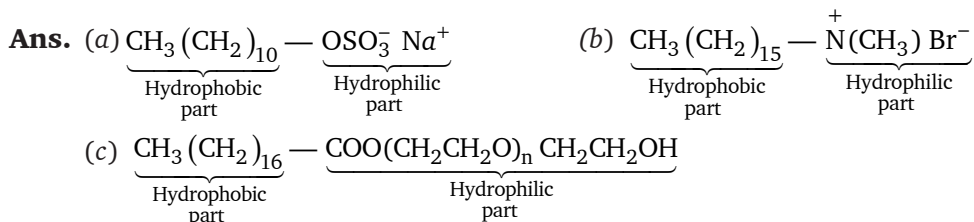
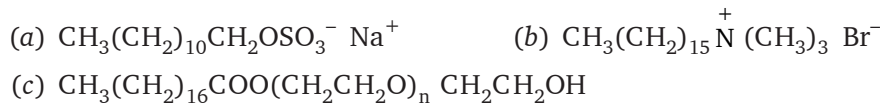
Ans. Soaps contain chemical substances which concentrate at the surface of the solution or interface form surface films which reduce surface tension of the solution and helps in removing dirt and dust by emulsifying grease are called surface active agents or

surfactants. The molecules of surfactants contain two characteristic groups one which is water soluble (hydrophilic part) and other which is oil soluble (hydrophobic part).

16.26. If water contains dissolved calcium hydrogencarbonate, out of soaps and synthetic detergents which one will you use for cleaning clothes?

Ans. Synthetic detergents will be useful because they can work well even in hard water containing calcium hydrogencarbonate.

16.27. Label the hydrophilic and hydrophobic parts in the following compounds.



ADDITIONAL QUESTIONS SOLVED

I. Very Short Answer Type Questions

(1 Mark)

Q1. Give one example of an artificial sweetener used by the diabetic patients.

[AI 2009]

Ans. Saccharin/Aspartame

Q2. What is meant by the term broad spectrum antibiotics? [AI 2008]

Ans. Antibiotics which kill or inhibit a wide range of gram-positive and gram-negative bacteria are said to be broad spectrum antibiotics.

Q3. Name a substance that can be used as an antiseptic as well as a disinfectant.

[AI 2008]

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

Q4. Give one important use of each of the following in pharmacy. [AI 2005]

(i) Equanil (ii) Morphine

Ans. (i) **Equanil:** It brings calmness and thus reduce nervous tension.

(ii) **Morphine:** It reduces the acute pain in any part of the body.

Q5. Name a food preservative which is most commonly used by food producers.

[CBSE 2007]

Ans. Common salt

Q6. Describe and illustrate with an example, a detergent. [AI 2007]

Ans. Detergent is sodium or potassium salt of benzene sulphonic acid or sulphonates of unsaturated hydrocarbons of alkene type, e.g.— sodium alkyl benzene sulphonate.

Q7. Define the following and give one example — Tranquilisers. [CBSE 2006, 04 C]

Ans. Tranquilisers: Those drugs which reduces anxiety and produce a feeling of well being, e.g. Equanil, Seconal, etc.

Q8. Describe the following giving a suitable example—Antioxidants. [CBSE 2006 C]

Ans. Antioxidants are chemicals which are used to prevent oxidation and spoilage of food, e.g. BHA (Butylated hydroxy anisole).

Q9. Describe the following type of substances giving suitable examples—Antiseptics.

[CBSE 2005]

Ans. Antiseptics: Those chemicals which kill or prevent the growth of micro-organisms. Antiseptics could be applied to the living tissues such as wounds, cuts, etc. Example—Dettol, Soframycine.

Q10. List two major classes of antibiotics and give one example of each class.

[AI 2004 C]

Ans. (i) Narrow spectrum antibiotics, e.g. Pencillin.

(ii) Broad spectrum antibiotics, e.g. chloramphenicol.

Q11. Why is bithional added to the toilet soap?

[AI 2003 C]

Ans. It acts as an antiseptic.

Q12. Give an example of a narcotic which is used as analgesic.

[AI 2003 C]

Ans. Morphine

Q13. Pick out the odd one from the following on the basis of their medicinal properties mentioning the reason:

- Chloroxylenol
- Phenol
- Chloramphenicol
- Bithional

Ans. Chloramphenicol is a broad spectrum antibiotic whereas others are antiseptic.

Q14. What type of drug pencillin is?

Ans. Antibiotic

Q15. What is the use of derivatives of barbituric acid?

Ans. They are used as Tranquilisers.

Q16. Why is ethanol added to soap?

Ans. Eathanol is added to soap to make it transparent.

Q17. What is the use of a compound which is obtained from the bark of a willow tree?

Ans. It is used as an analgesic.

Q18. Name two narcotics which are used as analgesics.

Ans. Morphine, Codeine

Q19. Name the chemicals responsible for the antiseptic properties of dettol.

Ans. Chloroxylenol and terpineol.

Q20. What type of drug phenacetin is?

Ans. Phenacetin is analgesic and antipyretic.

Q21. What is the use of plant *Rauwolfia serpentina* in Ayurveda?

Ans. It is used for reducing blood pressure.

II. Short Answer Type Questions

(2 or 3 Marks)

Q1. In order to wash clothes with water containing dissolved calcium hydrogen carbonate, which cleaning agent will you prefer soaps or synthetic detergents? Give one advantage of soaps over synthetic detergents.

[AI 2009]

Ans. Calcium ions form insoluble precipitate which separates as scum in water. Hence detergent will be preferred. Soaps are bidegradable, whereas detergents are non-biodegradable.

Q2. How do antiseptics differ from disinfectants? Give one example of each types.

[AI 2009]

Ans. Antiseptics are the chemical substances which prevent the growth of micro-organisms and may even kill them but are not harmful to human and animal tissues. For example dettol.

Disinfectants are chemical substances which kill micro-organisms but are not safe to be applied to the living tissues. For example—1% solution of phenol.

Q3. Mention one use of each of the following drugs:

- (i) Ranitidine
- (ii) Paracetamol
- (iii) Tincture of iodine

[AI 2008]

Ans. (i) **Ranitidine** is used as an antacid.

(ii) **Paracetamol** is used to bring down the body temperature during high fever.

(iii) **Tincture of iodine** is used as an antiseptic. It is 2–3% solution of iodine in alcohol and water.

Q4. Describe the following with examples:

- (i) Antipyretics
- (ii) Analgesic

[AI 2006]

Ans. (i) **Antipyretics:** The medicines taken to lower the body temperature in fever is called antipyretics. Example— Crocin, Aspirin, Paracetamol etc.

(ii) **Analgesics:** The medicines which are used to relieve body pains are known as analgesics. Examples— Novalgin, Butaz-olidine, etc.

Q5. Describe the following with suitable examples:

(i) Preservatives

(ii) Artificial sweetening agents.

[AI 2005]

Ans. (i) **Preservatives:** Preservatives are the substances which are used to prevent spoilage of food due to microbial growth.

Examples— Sodium benzoate, Common salt.

(ii) **Artificial sweetening agents:** These are the chemical substances which are used to create sweet taste in food items in place of sugar.

Example— Saccharin, Aspartame.

Q6. Give three examples of sulpha drugs and write their main uses. [CBSE 2003 C]

Ans. (i) Sulphadiazine
(ii) Sulphaguanidine
(iii) Sulphanilamide.

They are used in place of antibiotics to prevent the growth of micro-organisms.

Q7. Give one important use of each of the following:

(i) Bithional

(ii) Chloramphenicol

(iii) Streptomycin

(iv) Paracetamol [CBSE 2003]

Ans. (i) **Bithional** is added to soap so as to impart antiseptic properties to the soap.

(ii) **Chloramphenicol** is a broad spectrum antibiotic used in curing typhoid, meningitis.

(iii) **Streptomycin** is used for the treatment of T.B (Tuberculosis).

(iv) **Paracetamol** is an antipyretic used in bringing down temperature in high fever.

Q8. Describe the following giving an example in each case: [AI 2004]

(i) Edible colours

(ii) Antifertility drugs

Ans. (i) **Edible colours:** They are used for dyeing food, e.g. dye is used to dye orange peels so that orange retain their colour.

Colour is also added in fruit juice. e.g.—saffron is used to colour rice.

(ii) **Antifertility drugs:** Those drugs which control the birth of the child are called antifertility drugs. For example Mifepristone, Norethindrone.

Q9. Describe the following with examples.

(a) Preservatives.

(b) Biodegradable detergents.

[AI 2004]

Ans. (a) **Preservatives:** Those chemicals which are used to prevent food from spoilage are called preservatives. For example sodium benzoate.

(b) **Biodegradable detergents:** Those detergents which are decomposed by micro-organisms are called biodegradable detergents. For example, detergents having linear alkyl chains.

Q10. Name the medicines used for the treatment of the following diseases:

(i) Tuberculosis

(ii) Typhoid [AI 2005 C]

Ans. (i) Streptomycin

(ii) Chloramphenicol

Q11. Describe the following with an example of each.

(i) Antimicrobials

(ii) Analgesics [AI 2005]

Ans. (i) **Antimicrobials:** Those drugs which are used to kill microbes are called antimicrobials, e.g. penicillin, tetracycline.

- (ii) **Analgesics** are the drugs which are used to reduce pain and are also known as pain relievers, e.g. Aspirin.

Q12. State the function along with one example each of [CBSE 2005]

- (i) Antihistamines
(ii) Antioxidants

Ans. (i) **Antihistamines** are those which counteract the effect of histamines which is generated in body due to allergy. E.g., Diphenylhydramine, promethazine, etc.

- (ii) **Antioxidants** are those chemicals which prevent oxidation of food and other materials, e.g. BHA and BHT (Butylated hydroxytoluene).

Q13. Name a broad spectrum antibiotic and state two diseases for which it is prescribed. [Foreign 2006]

Ans. Chloramphenicol used in typhoid, meningitis.

Q14. Mention one important use of each of the following: [Foreign 2007]

- (i) Equanil (ii) Sucrolose

Ans. (i) **Equanil:** As a tranquiliser.

- (ii) **Sucrolose:** It is used as an artificial sweetener.

Q15. Name the action of the following on the human body:

- (a) Aspirin (b) Penicillin
(c) Phenacetin (d) Morphine
(e) Analgin (f) Luminal
(g) Seconal (h) Streptomycin

Ans. (a) **Aspirin** is an analgesic which is used for relieving pain. It also prevents heart attack.

- (b) **Penicillin** is an antibiotic used against large number of infections caused by various cocci, gram positive bacteria, etc. It is an effective drug for pneumonia, bronchitis, sore throat.

(c) **Phenacetin** is an antipyretic drug used to bring down the temperature of body in high fever.

- (d) **Morphine** is a strong analgesic. It is a narcotic drug. It causes addiction. It gives relief from acute pain, induces sleep and unconsciousness in higher doses.

(e) **Analgin** is an antipyretic and analgesic. It brings down the temperature of body in fever and gives relief from pain.

(f) **Luminal** produces sleep and it is a habit forming drug. It is also called a sedative tranquiliser.

(g) **Seconal** is an antidepressant (tranquiliser). Sometimes the patients are highly depressed and lose self-confidence. This drug produces feeling of well being and improved efficiency.

(h) **Streptomycin** is used as an antibiotic. It is used to cure tuberculosis.

Q16. What are detergents? How are they classified? Why are detergents preferred over soaps? [AI 2006 C, AI 2014]

Ans. Detergents are sulphonate or hydrogen sulphate salts of long chain hydrocarbons containing 12–18 carbon atoms.

Types of detergents

- (i) Cationic detergents
(ii) Anionic detergent
(iii) Non-ionic detergents

Advantage of detergents over soaps: Unlike soaps they work well even with hard water. They can work well even in acidic water. They are more effective than soaps.

Q17. Define the following and give one example of each. [AI 2004 C]

- (i) Antihistamines
(ii) Antacids

Ans. (i) **Antihistamines:** Those drugs which counteract the effect of histamines which is produced due to allergy, e.g. diphenylhydrazine.

- (ii) **Antacids:** Those drugs which are used in hyperacidity, e.g. Ranitidine.

III. Value-Based Questions

Q1. Ashraf is 50 years old and has diabetes. He uses saccharin as sweetening agent in tea and coffee and sugar free in sweets. Lakshmi too is diabetic. She controls her sugar level in diet by using less sugar and by exercising.

- (a) Who is able to handle diabetes more efficiently and why?
(b) What value do you derive from this?
(c) What are the harmful effects of artificial sweeteners?

Ans. (a) Lakshmi is able to handle diabetes better, because **exercise** activates the pancreases to produce insulin. Exercise keeps one fit and fine.
(b) It is necessary to lead a disciplined life.
(c) Researches have shown that the artificial sweeteners have harmful effect on the body because they are not excreted easily.

Q2. Almelu did not like the costlier brand of a detergent because she was not satisfied by using less quantity of the detergent, so she bought the cheaper brand of detergent and used large amount of it.

- (a) As a student of chemistry what would you advise Almelu to use?
(b) Why? Explain.
(c) What value did you impart to Almelu?

Ans. (a) I would advise Almelu to use smaller quantities of the costlier detergent.
(b) Almelu was pouring detergents into the drain. These detergents are not biodegradable. Branched detergents are highly non biode-

gradable because the microbes cannot attack it. Straight chain detergents are being prepared these days to reduce the pollution problem. The costlier detergents contain straight chain hydrocarbon.

- (c) The value imparted was to use environment friendly substances.

Q3. Ruben is a football player. After playing he had severe muscle pain. His brother's friend Suhail asked him to take ENO along with the medicine.

- (a) Why?
(b) What value can you get from this fact?

Ans. (a) Analgesic relieves pain from muscular cramps. But it causes acidity in the stomach. To relieve from acidity antacid is given. ENO is an antacid.

- (b) Be open minded to accept a suggestion from a friend because friend in need is a friend indeed.

Q4. Rahul's father recovered from a massive heart attack. As follow up doctor gave him Aspirin. After sometime he had stomachache, then Rahul's wife gave him some butter milk.

- (a) After sometime he started to develop stomachache, why?
(b) Why Rahul's wife gave butter milk to her father-in-law?
(c) What value of Rahul's wife is reflected in this act?

Ans. (a) Aspirin is a blood thinner. Hence for a patient suffering from heart attack is given Aspirin. Aspirin is acetylated salicylic acid. In the presence of acid in the stomach it undergoes hydrolysis to form two acids, namely salicylic acid and acetic acid. This increases the acidity in the stomach.

- (b) To neutralise this acidity butter milk is also given.

(c) Rahul's wife is intelligent, helpful and a critical thinker.

Q5. On the occasion of World Health Day, Dr. Satpal organised a 'health camp' for the poor farmers living in a nearby village. After check-up, he was shocked to see that most of the farmers suffered from cancer due to regular exposure to pesticides and many were diabetic. They distributed free medicines to them. Dr. Satpal immediately reported the matter to NHRC, the government decided to provide medical care, financial assistance, setting up of super-speciality hospitals for treatment and prevention of the deadly diseases in the affected villages all over India.

- (i) Write the values shown by
- Dr. Satpal
 - NHRC
- (ii) What type of analgesics are chiefly used for the relief of pains of terminal cancer? [CBSE 2014]

Ans. (i) (a) Scientific attitude and Awareness.
(b) Helpful and Caring.
(ii) (a) Aspirin
(b) Aspartame

Q6. Mr. Roy, the principal of one reputed school organised a seminar in which he invited parents and principals to discuss the serious issue of diabetes and depression in students. They all resolved this issue by strictly banning the junk food in schools and to introduce healthy snacks and drinks like soup, lassi, milk etc. in school canteens. They also decided to make compulsory half an hour physical activities for the students in the morning assembly daily. After six months, Mr. Roy conducted the health survey in most of the schools and discovered a tremendous improvement in the health of students.

After reading the above passage, answer the following:

- What are the values (at least two) displayed by Mr. Roy?
- As a student, how can you spread awareness about this issue?
- What are tranquilisers? Give an example.
- Why is use of aspartame limited to cold foods and drinks?

[CBSE 2015]

Ans. (i) The values displayed by Mr. Roy are of concern and care.
(ii) As a student, one can help by spreading awareness about this matter through posters, skits, nukkad natak, holding symposiums, etc.
(iii) Tranquilisers are neurologically active drugs that induces a sense of well being and are used to treat stress, anxiety and mild or severe mental diseases, e.g. Equanil and meprobamate.
(iv) The use of aspartame is limited to cold foods and drinks as it is unstable at cooking temperature.

III. HOTS Questions

Q1. What do you understand by broad spectrum antibiotics?

Ans. These are effective against several types of bacteria. For example tetracycline, chloramphenicol, ofloxacin are used as broad spectrum antibiotics.

Q2. (i) What class of drug is Ranitidine?
(ii) If water contains dissolved Ca^{2+} ions, out of soaps and synthetic detergents, which will you use for cleaning clothes?
(iii) Which of the following is an anti-septic?

0.2% phenol, 1% phenol
Ans. (i) It is an antacid.

(ii) In this case we use synthetic detergents because it give foam with hard water.

(iii) 0.2% solution of phenol acts as antiseptic.

Q3. Define the following by giving one example of each:

(i) Antiseptics

(ii) Antioxidants

(iii) Narcotic analgesics

Ans. (i) Antiseptics are the chemicals applied to the living tissues either to kill or prevent the growth of micro organisms, *e.g.*, dettol.

(ii) Antioxidants are the compounds which retards the action of oxygen on food and reduces its rate of decomposition by oxidation, *e.g.* BHA.

(iii) Narcotic analgesics are the chemicals used for the relief of post operative pain, *e.g.* morphine.

Q4. In order to wash clothes which cleaning agent what will you prefer and why: soap or synthetic detergents? Give one advantage of soaps and synthetic detergents each.

Ans. Soaps have straight hydrocarbon chains and are easily degraded by bacteria present in the sewage water and hence, do not cause water pollution. Most of the detergents are non-biodegradable and hence cause water pollution of rivers and waterways. So, one will prefer soap.

Q5. Your friend got a small injury while cycling. Why will you suggest to use antiseptic on wounds not disinfectant?

Ans. Antiseptics are safe to apply on living tissues, whereas disinfectant are chemical substances which will kill micro-organisms but are not safe to be applied to the living tissues.

Q6. How does an anti-fertility drug is useful to control population and related issues?

Ans. Chemical substances which are used to check pregnancy in women are called anti-fertility drugs or birth control pills or oral contraceptives. It has introduced the concept of family planning.

