The cover features a textured brown background. A large yellow circle is positioned on the left side, containing the word 'Chemistry' in white. To the right of the circle, the words 'Part I' are written in yellow. The cover is decorated with several molecular models: a cluster of white and blue spheres at the top right, a cluster of white and blue spheres at the bottom left, and a complex orange skeletal structure on the right side. There are also several small yellow circles scattered across the cover.

# Chemistry

Part I

Textbook for Class XII

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## Chapter – 16 (Chemistry in Everyday Life)

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### Exercise Questions:

#### Question:1 Why do we need to classify drugs in different ways?

Answer:

The classification of drugs and the reasons for classification are as follows:

(i) On the basis of pharmacological effect:

This classification provides doctors the whole range of drugs available for the treatment of a particular type of problem. Hence, such a classification is very useful to doctors.

(ii) On the basis of drug action:

This classification is based on the action of a drug on a particular biochemical process. Thus, this classification is important.

(iii) On the basis of chemical structure:

This classification provides the range of drugs sharing common structural features and often having similar pharmacological activity.

(iv) On the basis of molecular targets:

This classification provides medicinal chemists the drugs having the same mechanism of action on targets. Hence, it is the most useful to medicinal chemists.

#### Question:2 Explain the term, target molecules or drug targets.

Answer:

In medical chemistry, drug targets refer to the key molecules involved in certain metabolic pathways that result in specific disease. Carbohydrates, proteins, lipids, and nucleic acids are examples of drug targets.

Drugs are chemical agents designed to inhibit these target molecules by binding with the active sites of the key molecules.

#### Question:3 Name the macromolecules that are chosen as drug targets.

Answer:

The macromolecules chosen as drug targets are carbohydrates, lipids, proteins, and nucleic acids.

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**Question:4 Why should not medicines be taken without consulting doctors?**

Answer:

A medicine can bind to more than one receptor site. Thus, a medicine may be toxic for some receptor sites. As a result, medicines may be poisonous in such cases. Hence, medicines should not be taken without consulting doctors.

**Question:5 Define the term chemotherapy.**

Answer:

The use of chemicals for therapeutic effect is called chemotherapy.

For example, the use of chemicals in the diagnosis, prevention and treatment of diseases.

**Question:6 Which forces are involved in holding the drugs to the active site of enzymes?**

Answer:

Either of the following forces can be involved in holding drugs to the active sites of enzymes .

- i.) Ionic bonding.
- ii.) Hydrogen bonding.
- iii.) Dipole – dipole interaction.
- iv.) Van der Waals forces.

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

Answer:

Specific drugs affect particular receptors. Antacids and anti – allergic drugs work on different receptors. This is the reason why antacids and anti – allergic drugs do not interfere with each other's function, but interfere with the functions of histamines.

**Question:8 Low level of noradrenaline is the cause of depression. what type of drugs are needed to cure this problem? Name two drugs.**

Answer:

Anti – depressant drugs are needed to counteract the effect of depression. these drugs inhibit enzymes catalysing the degradation of the neurotransmitter, noradrenaline. As a result, the important neurotransmitter is slowly metabolised and then it can activate its receptor for longer period of time.

Two anti – depressant drugs are:

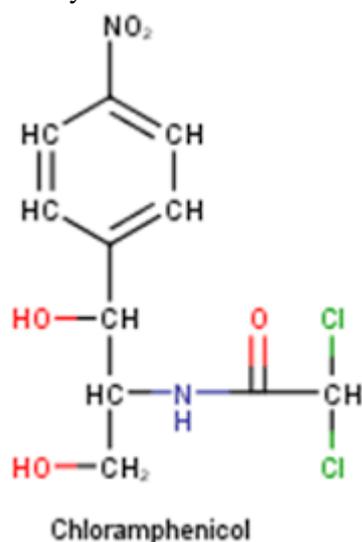
- i.) Iproniazid.

ii.) Phenelzine

**Question:9 What is meant by the term ‘broad spectrum antibiotics’? Explain.**

Answer:

Antibiotics that are effective against a wide range of gram-positive and gram-negative bacteria are known as broad spectrum antibiotics. Chloramphenicol is a broad spectrum antibiotic. It can be used for the treatment of typhoid, dysentery, acute fever, pneumonia, meningitis, and certain forms of urinary infections.



Ampicillin and amoxicillin – synthetically modified from penicillin – are also broad spectrum antibiotics.

**Question:10 How do antiseptics differ from disinfectants? Give one example of each.**

Answer:

Antiseptics are applied to wounds, cuts, diseased skin surfaces or we can simply say that applied on living tissues. Ex-Bithionol (bithional) used in soaps to provide antiseptic also Dettol the most famous one is an antiseptic mixture of chloroxylenol and terpineol. Whereas Disinfectants are applied to objects that we usually use or we can say inanimate objects like floor, instruments, toys etc. Ex-Chlorine in the concentration of 0.2 to 0.4 ppm in aq. solution and sulphur dioxide in very low concentration.

Some time disinfectants can act as antiseptics by varying their concentration. Ex-0.2% solution of phenol is an antiseptic while its 1% solution is a disinfectant.

**Question:11 Why are cimetidine and ranitidine better antacids than sodium hydrogencarbonate or magnesium or aluminium hydroxide ?**

Answer:

Antacids such as sodium hydrogen carbonate, magnesium hydroxide, and aluminium hydroxide work by neutralising the excess hydrochloric acid present in the stomach. However, the root cause for the release of excess acid remains untreated.

Cimetidine and ranitidine are better antacids as they control the root cause of acidity. These drugs prevent the interaction of histamine with the receptors present in the stomach walls. Consequently, there is a decrease in the amount of acid released by the stomach. This is why cimetidine and ranitidine are better antacids than sodium hydrogen carbonate, magnesium hydroxide, and aluminium hydroxide.

**Question:12 Name a substance which can be used as an antiseptic as well as disinfectant.**

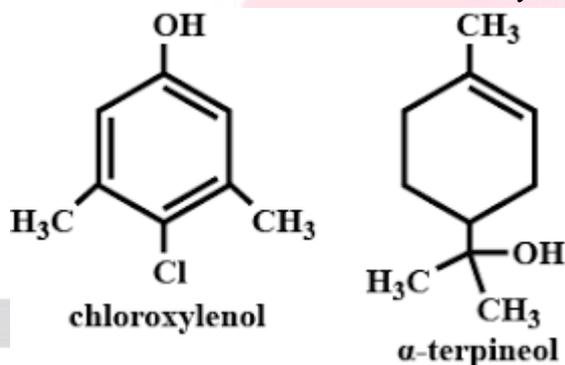
Answer:

Phenol can be used as an antiseptic as well as disinfectant. 0.2 % solution of phenol is used as an antiseptic, while 1% of its solution is used as an disinfectant.

**Question:13 What are the main constituents of Dettol.**

Answer:

The main constituents of Dettol are chloroxylenol and  $\alpha$ -terpineol.



**Question:14 What is tincture of iodine ? What is its use ?**

Answer:

Tincture of iodine is a 2 – 3 percent solution of iodine in alcohol – water mixture.

It is applied to wounds as an antiseptic.

**Question:15 What are food preservatives?**

Answer:

Food preservatives are chemicals that prevent food from spoilage due to microbial growth. Table salt, sugar, vegetable oil, sodium benzoate and salts of propanoic acid are some examples of food preservatives.

**Question:16 Why is use of aspartame limited to cold foods and drinks?**

Answer:

Aspartame becomes unstable at cooking temperature. This is the reason why its use is limited to cold foods and drinks.

**Question:17 What are artificial sweetening agents ? Give two examples.**

Answer:

Artificial sweetening agents are chemicals that sweeten the food. However, unlike natural sweeteners, they do not add calories to our body. They do not harm the human body. Some artificial sweeteners are aspartame, saccharin, sucralose, and alitame.

**Question:18 Name the sweetening agent used in the preparation of sweets for a diabetic patient .**

Answer:

Artificial sweetening agent such as saccharin, alitame and aspartame can be used in preparing sweets for diabetic patients.

**Question:19 What problem arises in using alitame and artificial sweetener?**

Answer:

Alitame is high sweetener. It is difficult to control the sweetness of food while using alitame as an artificial sweetener.

**Question:20 How are synthetic detergents better than soaps?**

Answer:

Soaps work in soft water. However, they are not effective in hard water. In contrast, synthetic detergents work both in soft water and hard water.

Therefore, synthetic detergents are better than soaps.

**Question:21 Explain the following terms with suitable example:**

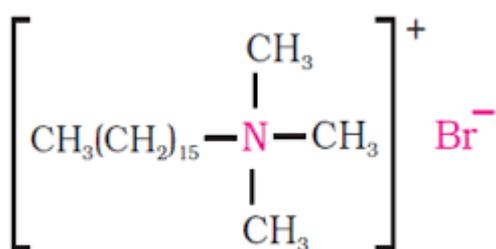
- i.) **Cationic detergent**
- ii.) **Anionic detergent**
- iii.) **Non – ionic detergents.**

Answer:

(i) Cationic detergent

Cationic detergents are quaternary ammonium salts of acetates, chlorides, or bromides. These are called cationic detergents because the cationic part of these detergents contains a long hydrocarbon chain and a positive charge on the N atom.

For example: cetyltrimethylammonium bromide.



Cetyltrimethyl ammonium bromide

(ii) Anionic detergents

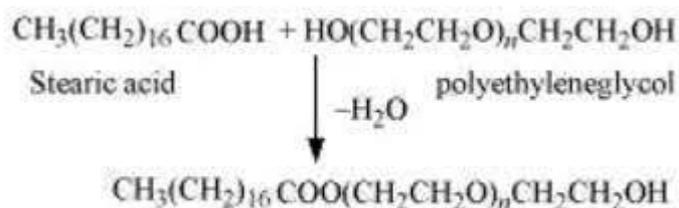
Anionic detergents are of two types:

1.Sodium alkyl sulphates: These detergents are sodium salts of long chain alcohols. They are prepared by first treating these alcohols with concentrated sulphuric acid and then with sodium hydroxide. Examples of these detergents include sodium lauryl sulphate ( $\text{C}_{11}\text{H}_{23}\text{CH}_2\text{OSO}_3\text{-Na}^+$ ) and sodium stearyl sulphate ( $\text{C}_{17}\text{H}_{35}\text{CH}_2\text{OSO}_3\text{-Na}^+$ ).

2.Sodium alkylbenzenesulphonates: These detergents are sodium salts of long chain alkyl benzene sulphonic acids. They are prepared by Friedel-Crafts alkylation of benzene with long chain alkyl halides or alkenes. The obtained product is first treated with concentrated sulphuric acid and then with sodium hydroxide. Sodium 4-(1-dodecy) benzene sulphonate (SDS) is an example of anionic detergents.

(iii) Non-ionic detergents

Molecules of these detergents do not contain any ions. These detergents are esters of alcohols having high molecular mass. They are obtained by reacting polyethylene glycol and stearic acid.



**Question:22 What are biodegradable and non – biodegradable detergents? Give one example of each.**

Answer:

Detergents that can be degraded by bacteria are called biodegradable detergents. Such detergents have straight hydrocarbon chain. For example: sodium lauryl sulphate.

Detergents that cannot be degraded by bacteria are called non – biodegradable detergents. Such detergents have highly – branched hydrocarbon chains. For example: sodium-4- (1,3,5,7 – tetramethyl octyl) benzene sulphonate.

**Question:23 Why do soaps not work in hard water?**

Answer:

Soaps are sodium or potassium salts of long – chain fatty acids. Hard water contains calcium and magnesium ions. When soaps dissolved in hard water, these ions displace sodium or potassium from their salts and form insoluble calcium or magnesium salts of fatty acids. These insoluble salts separate as scum.



Soap insoluble calcium stearate (soap)

This is the reason why soaps do not work in hard water.

**Question:24 Can you use soaps and synthetic detergents to check the hardness of water?**

Answer:

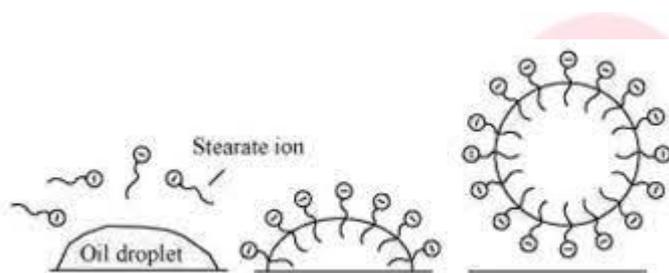
Soaps get precipitated in hard water, but not in soft water. Therefore, soaps can be used for checking the hardness of water.

However, synthetic detergents do not get precipitated either in hard water or in soft water. Therefore, synthetic detergents cannot be used for checking the hardness of water.

**Question:25 Explain the cleansing action of soaps.**

Answer:

Soap molecules form micelles around an oil droplet in such a way that the hydrophobic parts of the stearate ions attach themselves to the oil droplet and the hydrophilic parts project outside the oil droplet. Due to the polar nature of the hydrophilic parts, the stearate ions (along with the dirt) are pulled into water, thereby removing the dirt from the cloth.



**Question:26 If water contains dissolved calcium hydrogencarbonate, out of soap and synthetic detergents which one will you use for cleaning clothes ?**

Answer:

Synthetic detergents are preferred for cleaning clothes. When soaps are dissolved in water containing calcium ions, these ions form insoluble salts that are of no further use.

However, when synthetic detergents are dissolved in water containing calcium ions, these ions form soluble salts act as cleansing agents.

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

- i.)  $\text{CH}_3(\text{CH}_2)_{10}\text{CH}_2\text{OSO}_3^-\text{Na}^+$
- ii.)  $\text{CH}_3(\text{CH}_2)_{15}\text{N}^+(\text{CH}_3)_3\text{Br}^-$
- iii.)  $\text{CH}_3(\text{CH}_2)_{16}\text{COO}(\text{CH}_2\text{CH}_2\text{O})_n\text{CH}_2\text{CH}_2\text{OH}$ .

Answer:

- i.)  $\text{CH}_3(\text{CH}_2)_{10}$  – hydrophobic part  
 $\text{CH}_2\text{OSO}_3^-\text{Na}^+$  - hydrophilic part
- ii.)  $\text{CH}_3(\text{CH}_2)_{15}$  – hydrophobic part  
 $\text{N}^+(\text{CH}_3)_3\text{Br}^-$  - hydrophilic part
- iii.)  $\text{CH}_3(\text{CH}_2)_{16}$  – hydrophobic part  
 $\text{COO}(\text{CH}_2\text{CH}_2\text{O})_n\text{CH}_2\text{CH}_2\text{OH}$  – hydrophilic part.