

CBSE NCERT Solutions for Class 12 Chemistry Chapter 15

Back of Chapter Questions

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

Solution:

Sleeping pills are tranquilizers. Sleeping pills help in inducing sleep for people suffering from insomnia by depressing the activities of the central nervous system. These drugs if taken for a prolonged time, they can become addictive. It also causes aftereffects like drowsiness, hallucinations, slow heart rate. If taken in a very excessive dosage the person can enter a state of coma and death can take place. Therefore they are not advisable for intake without consultation with the doctor.

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

Solution:

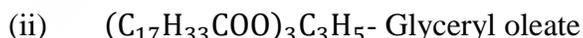
The given statement 'ranitidine is an antacid' refers to the classification based on pharmacological effects of the drug. Antacids refer to the class of drugs which relieve the acidity by either reacting with the excess acid in the stomach [eg – magnesium hydroxide] or by preventing the secretion of an excess of acids by the stomach cells [eg – ranitidine].

3. Why do we require artificial sweetening agents?

Solution:

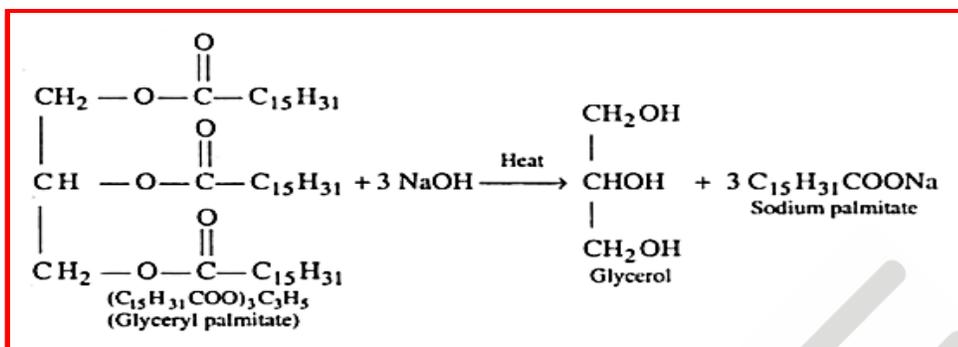
A large number of people in the world are suffering from diseases such as diabetes and obesity. They are advised to reduce their calorie intake. These people cannot take normal sugar (sucrose) as it is harmful for them since they add many calories. Therefore, artificial sweetening agents that do not add to the calorie intake of a person are required. These get excreted from the body in the urine unchanged. Saccharin(500 times as sweet as sucrose), aspartame(160 times as sweet as sucrose), and alitame are a few examples of artificial sweeteners.

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

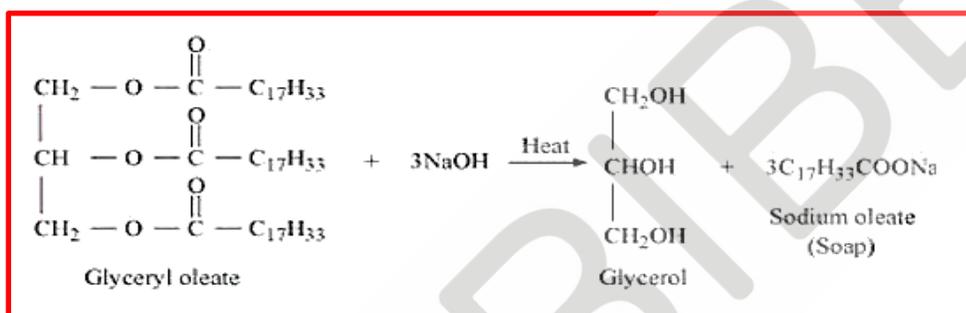


Solution:

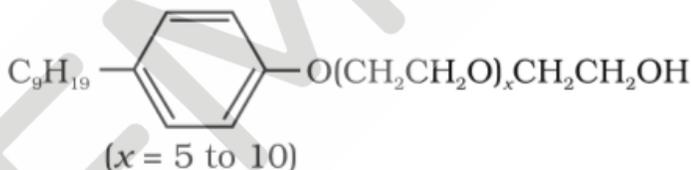
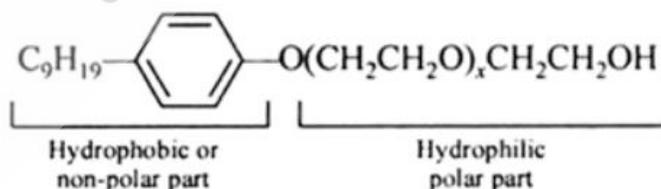
(i)



(ii)



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.

**Solution:**

The Functional groups present in the molecule are:

- (i) Ether: The presence of R-O-R bonds(R refers to alkyl group) indicate ether
- (ii) Primary alcoholic group: -OH group is attached to a primary carbon.

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

Solution:

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

(i) On the basis of drug action:

This classification is based on the action of a drug on a particular biochemical process.

(ii) On the basis of chemical structure:

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

(iii) On the basis of pharmacological effect:

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

(iv) On the basis of molecular targets:

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

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

Solution:

In medicinal chemistry, drug targets refer to specific key molecules involved in certain metabolic pathways that result in specific diseases. Examples of drug targets are Carbohydrates, proteins, lipids, and nucleic acids. And drugs are the chemical agents designed to inhibit these target molecules by binding with the active sites of the key molecules.

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

Solution:

Carbohydrates, lipids, proteins, and nucleic acids are the macromolecules that are chosen as drug targets.

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

Solution:

A medicine has the ability to bind to more than one receptor site. Therefore a medicine may be toxic for some receptor sites. Also in most cases, if medicines are taken in a higher dosage than recommended it might cause harmful effects. As a result, medicines may be poisonous in such cases. Hence, medicines are not advised to be taken without the consultation of a doctor.

10. Define the term chemotherapy.

Solution:

The treatment of a disease by the use of chemical substances. For example the use of chemicals in the diagnosis, prevention, and treatment of diseases.

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

Solution:

The forces that can be involved in holding drugs to the active sites of enzymes are:

- (i) Ionic bonding
 - (ii) Hydrogen bonding
 - (iii) Dipole-dipole interaction
 - (iv) van der Waals force
12. While antacids and antiallergic drugs interfere with the function of histamines, why do these not interfere with the function of each other?

Solution:

Specific drugs affect some specific 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 functions but interfere with the functions of histamines.

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

Solution:

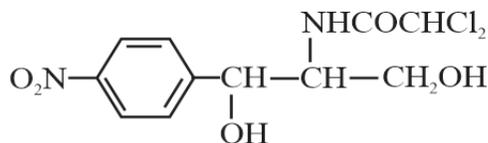
Antidepressant drugs are needed to counteract the effect of depression. These drugs inhibit enzymes catalysing the degradation of the neurotransmitter, noradrenaline. As a result, the important neurotransmitter is slowly metabolised and then it can activate its receptor for longer periods of time.

Two antidepressant drugs that are commonly used are:

- (i) Iproniazid
 - (ii) Phenelzine
14. What is meant by the term 'broad spectrum antibiotics'? Explain.

Solution:

Antibiotics that are effective against a wide range of gram-positive and gram-negative bacteria are known as broad-spectrum antibiotics. Chloramphenicol is an example of a broad-spectrum antibiotic.



Chloramphenicol

Chloramphenicol can be used for the treatment of acute fever, typhoid, dysentery, pneumonia, meningitis, and also certain forms of urinary infections.

Other broad-spectrum antibiotics are vancomycin, ofloxacin, Ampicillin and amoxicillin where Ampicillin and amoxicillin are synthetically modified from penicillin.

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

Solution:

Antiseptics and disinfectants are both used in daily lives since they are effective against harmful microorganisms. Antiseptics are applied to the living tissues such as wounds, cuts, ulcers, and diseased skin surfaces, while disinfectants are applied only to non-living objects such as floors, drainage system, instruments, etc. Disinfectants are harmful to living tissues.

Examples of antiseptics are Dettol, tincture of Iodine.

Examples of Disinfectants are chlorine, Potassium permanganate, 1% solution of phenol.

16. Why are cimetidine and ranitidine better antacids than sodium hydrogen carbonate or magnesium or aluminium hydroxide?

Solution:

Antacids such as sodium hydrogen carbonate, magnesium hydroxide, and aluminium hydroxide do not work to tackle the root cause. They only neutralise 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 work at the root cause of acidity. These drugs work by preventing the interaction of histamine with the receptors present in the stomach walls. Thus as a consequence, there is a decrease in the amount of acid released by the stomach. This is the reason why cimetidine and ranitidine are better antacids than sodium hydrogen carbonate, magnesium hydroxide, and aluminium hydroxide.

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

Solution:

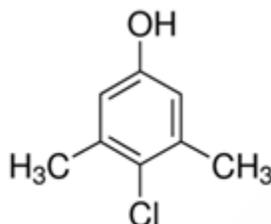
Phenol can be used as an antiseptic as well as a disinfectant. 0.2 percent solution of phenol is used as an antiseptic, while 1 percent of phenol is used as a disinfectant.

18. What are the main constituents of Dettol?

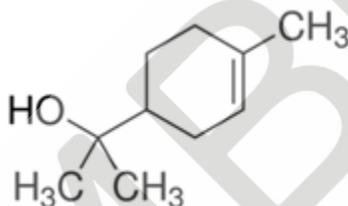
Solution:

The main constituents of Dettol are chloroxylenol and α -terpineol. It is a mixture or combination of chloroxylenol and terpineol in a suitable solvent.

Chloroxylenol structure is:



Terpineol structure is:



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

Solution:

Tincture of iodine is a 2 - 3 percent solution of iodine in an alcohol-water mixture. It is applied to wounds as an antiseptic. It kills all the microbes present in the wounded region.

20. What are food preservatives?

Solution:

Food preservatives are chemical substances that prevent food from spoilage due to microbial growth.

Some common examples of food preservatives are table salt, sugar, vegetable oil, sodium benzoate (C_6H_5COONa), and salts of propanoic acid.

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

Solution:

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

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

Solution:

Artificial sweetening agents are chemical substances that are used for sweetening food without adding any calories, unlike natural sweeteners. So they do not harm the human body. It is around 550 times sweet as cane sugar. It gets excreted from the body in the urine unchanged.

Hence these are helpful for people suffering from diabetes. Some examples of artificial sweeteners are aspartame, saccharin and alitame.

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

Solution:

Artificial sweetening agents such as saccharin, alitame, and aspartame can be used in preparing sweets for diabetic patients. These sweetening agents do not add any additional calories to the food hence reducing the calorie intake of the diabetic patient.

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

Solution:

Alitame is a high potency sweetener(2000 times as sweet as natural sugar). It is difficult to control the sweetness of food while using alitame as an artificial sweetener.

25. How are synthetic detergents better than soap?

Solution:

Soaps only work in soft water and are not effective in hard water. While synthetic detergents work both in soft water and hard water. Some of the Synthetic Detergents give foam even in ice cold water. Therefore, synthetic detergents are better than soaps.

Also the aqueous solutions of detergents are usually neutral and do not damage delicate fabrics and can be used for washing almost all types of fabrics. But aqueous solutions of soap are alkaline and damage delicate fabrics. Therefore, soaps cannot be used for washing delicate fabrics.

26. Explain the following terms with suitable examples

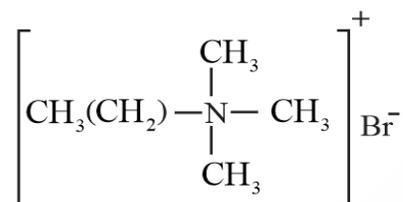
- (i) Cationic detergents
- (ii) Anionic detergents and
- (iii) Non-ionic detergents

Solution:

- (i) Cationic detergent

Cationic detergents are quaternary ammonium salts having long chain alkyl groups (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.

Example: cetyltrimethylammonium bromide



Cetyltrimethylammonium bromide

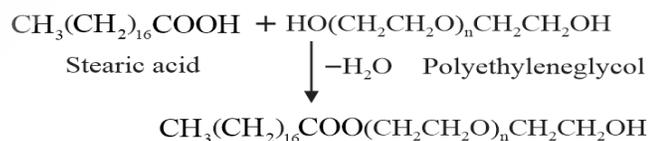
(ii) Anionic detergents

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 this type of detergent include sodium lauryl sulphate 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 alkylbenzenesulphonic 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-dodecyl)benzenesulphonate (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.



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

Solution:

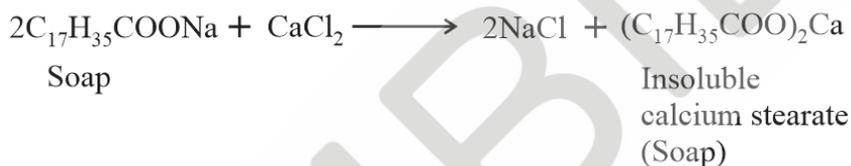
Detergents that can be degraded by bacteria are called biodegradable detergents. Such detergents have straight hydrocarbon chains. For example: sodium lauryl sulphate

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.

28. Why do soaps not work in hard water?

Solution:

Soaps are sodium or potassium salts of long-chain fatty acids. Hard water contains calcium and magnesium ions. When soaps are dissolved in hard water, these ions displace sodium or potassium from their salts and form insoluble calcium or magnesium salts of fatty acids. Due to this, the common soaps are unable to emulsify the greasy dirt and clean the dirt from the object. The calcium and magnesium soaps thus produced appear on the surface as insoluble scum.



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

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

Solution:

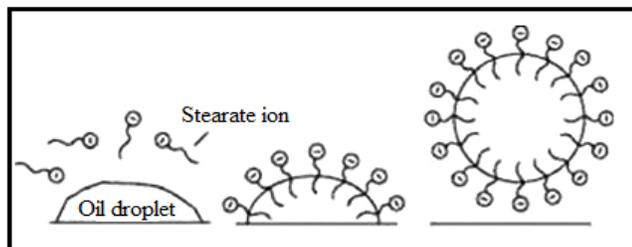
Soaps get precipitated as greyish sticky scum in hard water, but not in soft water. Therefore, soaps can be used for checking the hardness of the water.

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.

30. Explain the cleansing action of soaps.

Solution:

Soap molecules form micelles around an oil droplet (dirt) 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.



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

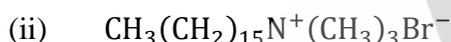
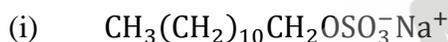
Solution:

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. We get a sticky greyish scum.

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

Hence Synthetic detergents are preferred for cleaning clothes.

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



Solution:

