

**Question 1:**

Why do we need to classify drugs in different ways?

**Solution:**

The reason for the drug's classification is as follows:

**(i) The pharmacological impact is based on:**

To physicians this definition is helpful. It provides a whole array of drugs to classify drugs to different diseases.

**(ii) Based on action on the drugs:**

This is based on a drug's action on a specific biochemical process.

**(iii) Building on chemical structure:**

The range of drugs that share common structural characteristics and have similar pharmacological activity.

**(iv) Building on molecular objectives:**

Many medications have the same action function on targets. In such cases this distinction is useful.

**Question 2:**

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

**Solution:**

The drug targets are the key molecule responsible for some metabolic pathways that can cause specific diseases. The drug targets are proteins, nucleic acids, carbohydrates and lipids.

Chemical agents used to block those target molecules are called drugs by fusing with the active sites of key molecules.

**Question 3:**

Name the macromolecules that are chosen as drug targets.

**Solution:**

Carbohydrates, lipids, proteins and nucleic acids are the macromolecules selected as targets for the drugs.

**Question 4:**

Why should medicines not be taken without consulting doctors?

**Solution:**

Medicines should not be taken without consulting a doctor because it can bind to more than one receptor site. Thus it can be harmful to some receptor sites. Medicines, when taken in higher doses, can cause harmful effects. So medicines can be poisonous.

**Question 5:**

**Define the term chemotherapy.**

**Solution:**

Chemotherapy is the use of chemicals for medicinal effects. Sources are the use of chemical agents for disease prevention, diagnosis and treatment.

**Question 6:**

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

**Solution:**

The forces responsible are

- (1) Hydrogen bonding
- (2) Ionic bonding
- (3) Van der Waals force
- (4) Dipole-dipole interaction

**Question 7:**

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

**Solution:**

Certain drugs only affect specific receptors. Antacids and antiallergic drugs do not interfere, as they work on different receptors. That is why antacids and antiallergic drugs interfere with histamine function but not with each other.

**Question 8:**

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

**Solution:**

Antidepressant drugs are used to lessen the depression effect. These drugs contain enzymes that catalyze the degradation of the neurotransmitter, noradrenaline. The neurotransmitter is therefore slowly metabolized and can activate the receptor for a longer period of time.

The two anti-depressant drugs are:

1. Phenelzine
2. Iproniazid

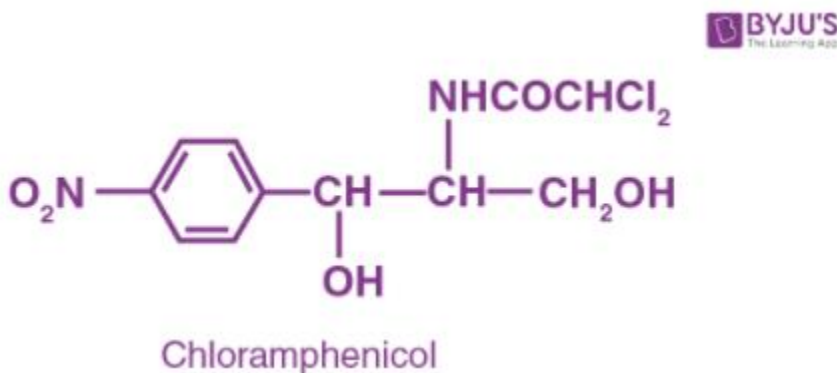
**Question 9:**

What is meant by the term 'broad spectrum antibiotics'? Explain.

**Solution:**

Antibiotics are known as broad-spectrum antibiotics, which are effective against a wide range of gram-negative and gram-positive bacteria. Eg: Chloramphenicol

This is used to treat acute fever, typhoid, meningitis, dysentery, tuberculosis and certain types of urinary tract infection. The other 2 broad-spectrum antibiotics are vancomycin and ofloxacin. Amoxicillin and ampicillin –synthetically derived from penicillin-, are also antibiotics of broad-spectrum.



**Question 10:**

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

**Solution:**

Disinfectants and antiseptics against micro-organisms are really successful. Antiseptics are used to treat living tissues such as cuttings, wounds, diseased skin surfaces and ulcers, while disinfectants are used for objects such as floors, drainage systems, instruments, etc. Disinfectants damage living tissues.

Iodine is a potent antiseptic. The iodine tincture is applied to wounds. One percent phenol solution is used as a disinfectant.

**Question 11:**

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

**Solution:**

The antacids that neutralize excess hydrochloric acid in the stomach are magnesium hydroxide, sodium hydrogen carbonate, and aluminium hydroxide. However, the motive for releasing excess acid remains untreated.

Cimetidine and ranitidine are good antacids because they control the acidity cause. These drugs prevent histamine from interacting with the receptors with the present in the walls of the stomach, and can, therefore, reduce the amount of acid released by the stomach.

**Question 12:**

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

**Solution:**

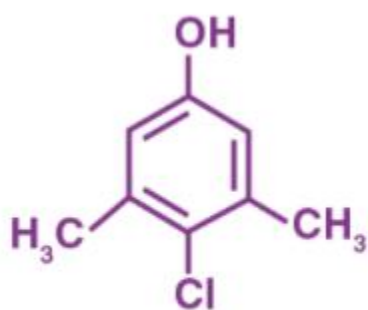
Phenol is the substance which can be used as an antiseptic and as a disinfectant. 0.2 percent phenol solution can be used as an antiseptic and 1 percent of the solution should be used for disinfectant.

**Question 13:**

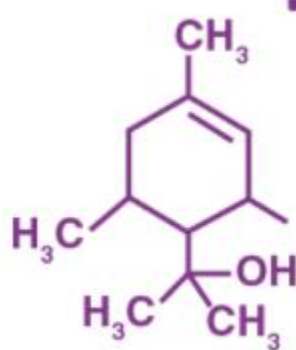
**What are the main constituents of Dettol?**

**Solution:**

Dettol's principal constituents are chloroxylenol and  $\alpha$  - *terpineol* .



Chloroxylenol



$\alpha$  - Terpineol

**Question 14:**

**What is tincture of iodine? What is its use?**

**Solution:**

For alcohol-water mixtures, 2-3 percent of iodine is referred to as iodine tincture and is primarily added to wounds.

**Question 15:**

**What are food preservatives?**

**Solution:**

Chemicals that prevent microbial growth are referred to as preservatives for food. They cut back on spoilage. Some food preservatives are sugar, table salt, vegetable oil, propanoic acid salts and sodium benzoate( $C_6H_5COONa$ ).

**Question 16:**

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

**Solution:**

Aspartame is not stable at cooking temperature and therefore their use is limited only to cold foods and beverages.

**Question 17:**

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

**Solution:**

Those chemicals which sweeten food are called artificial sweeteners. Artificial sweeteners don't add calories to our bodies and don't hurt the human body, either. Some known artificial sweeteners are sucralose, aspartame, alitame, and saccharin.

**Question 18:**

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

**Solution:**

Saccharin, aspartame and alitame are sweetening agents used to prepare sweets for patients with diabetes.

**Question 19:**

**What problem arises in using alitame as artificial sweetener?**

**Solution:**

Alitame is a sweetener of great potency. The sweetness of the food while using alitame as an artificial sweetener is difficult to control.

**Question 20:**

**How are synthetic detergents better than soaps?**

**Solution:**

Synthetic detergents are used in both soft water and hard water, while soaps are used in soft water. In hard water, soaps aren't effective. The synthetic detergents are therefore better than the soaps.

**Question 21:**

Explain the following terms with suitable examples

- (i) cationic detergents
- (ii) anionic detergents and
- (iii) non-ionic detergents.

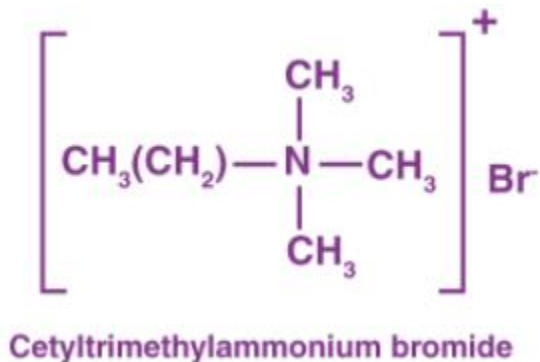
**Solution:**

**(i) Cationic detergents**

Cationic detergents are commonly called quaternary ammonium salts of acetates, chlorides, or bromides.

Cationic detergents are named as such because the cationic part of the aforementioned compound detergents has an extended hydrocarbon chain and a positive charge on the N atom.

eg: cetyltrimethylammonium bromide



**(ii) Anionic detergents**

Type of anionic detergents are as follows:

1. Sodium alkyl sulfate detergents are simply long-chain sodium alcohol salts. They are made by using concentrated sulphuric acid to react to such alcohol and subsequently by sodium hydroxide.

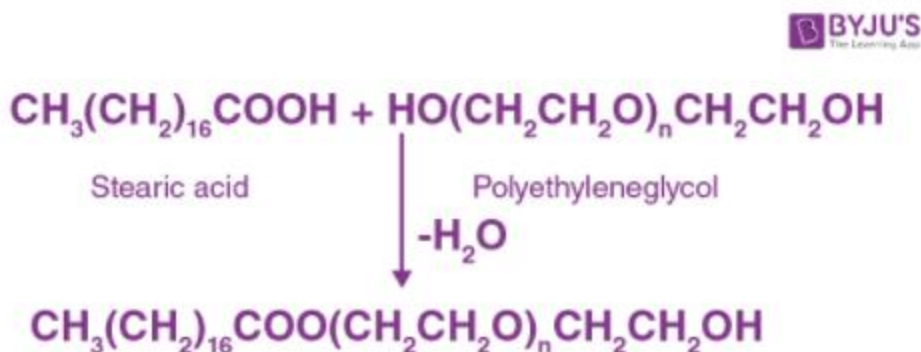
Examples of such detergents include sodium lauryl sulphate ( $C_{11}H_{23}CH_2OSO_3^- Na^+$ ) and sodium stearyl

sulphate( $C_{17}H_{35}CH_2OSO_3^- Na^+$ ).

2. Sodium alkylbenzenesulphonates: Sodium salts of long-chain alkylbenzenesulphonic acids are such detergents. These are synthesized by benzene alkylation by Friedel-Crafts along with alkyl halides or alkenes with long chains. The resulting product initially reacts with concentrated sulphuric acid and subsequently reacts with sodium hydroxide. Sodium 4-(1-dodecyl) benzenesulfonate is an example of anionic detergents.

**(iii) Non-ionic detergents**

There are no ions in molecules of those detergents. They are a good example of high-molecular-mass alcohol esters. These are prepared by the stearic acid and polyethylene glycol reactions.



**Question 22:**

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

**Solution:**

Biodegradable detergents are Bacteria degrading detergents. They do have straight chains of hydrocarbons. Sodium lauryl sulphate for example.

The non-biodegradable detergents are detergents that bacteria can not degrade. Their hydrocarbon chains are strongly branched.

For example: benzene sulphonate with sodium -4- (1, 3, 5, 7- tetramethyl octyl)

**Question 23:**

**Why do soaps not work in hard water?**

**Solution:**

Sodium or potassium salts with long-chain fatty acids are present in soaps. Hard water contains magnesium and calcium. When the ions displace sodium or potassium on dissolving soaps in hard water, insoluble calcium or magnesium salts of fatty acids form. Separate those insoluble salts as scum.

This is why soaps aren't working in harsh water.

**Question 24:**

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

**Solution:**

Soaps will precipitate in hard water but in soft water, it will not get precipitated and can, therefore, be used to find the water's hardness. On the other hand, synthetic detergents won't get precipitated in both hard water and soft water and can't be used to find water hardness.

**Question 25:**

**Explain the cleansing action of soaps.**

**Solution:**

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



**Question 26:**

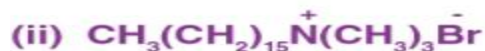
**If water contains dissolved calcium hydrogencarbonate, out of soaps and synthetic detergents which one will you use for cleaning clothes?**

**Solution:**

Synthetic detergents are commonly used for clothes washing. Such ions form insoluble salts when dissolved in water containing calcium ions which are of no use. Synthetic detergents are dissolved in calcium ion-containing water, such ions form soluble salts which act as cleaning agents.

**Question 27:**

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





Solution:

