

## CHEMISTRY IN EVERYDAY LIFE

### SOLVED SUBJECTIVE EXERCISE

#### Very Short Answer Type Questions (1 mark)

1. 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.
2. Name the macromolecules which are chosen as drug targets.  
**Ans.** Macromolecules such as nucleic acids, proteins, carbohydrates and lipids are called drug targets.
3. What is meant by the term broad 'spectrum antibiotics' ? Explain.  
**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, dysentery, urinary infections, meningitis and pneumonia.
4. 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 1% solution acts as a disinfectant.
5. 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.
6. Why is the use of aspartame limited to cold food and drinks ?  
**Ans.** Aspartame decomposes at baking or cooking temperatures and hence can be used only in cold food and drinks.
7. 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.
8. Why do soaps not work in hard water ?  
**Ans.** Hard water contains calcium and magnesium salts. In hard water, soaps get precipitated as calcium and magnesium soaps which being insoluble stick to the clothes as gummy mass.
9. What is the importance of the choice of the molecular target for a drug ?  
**Ans.** It is important to obtain the desired therapeutic effect of the drug.
10. What is aspirin ?  
**Ans.** Aspirin is acetyl salicylic acid (or 2-acetoxy benzoic acid) and used as an analgesic (Pain Killer).
11. What are receptors ?  
**Ans.** Proteins which are crucial to communication system in the body are called receptors.
12. How do the proteins of enzymes provide active sites ?  
**Ans.** The free functional groups of the constituent amino acids can participate in various intermolecular interactions and reactions and thus provide active sites.
13. What are antagonists ?  
**Ans.** Drugs that bind to the receptor site and inhibit its natural function are called antagonists.

14. What are agonists ?

Ans. Drugs that mimic the natural messenger by switching on the receptor are called agonists.

15. How do the drugs like brompheniramine and terfenadine (seldane) act as antihistamines ?

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

16. What is an antipyretic? Give an example.

Ans. Chemicals which are used to bring down the body temperature during high fever are called antipyretics. For example, paracetamol, aspirin, etc.

17. Why is bithional added to soap ?

Ans. Bithional acts as an antiseptic agent and reduces the odours produced by bacterial decomposition of organic matter on the skin.

18. What is the chemical composition of cationic detergents ?

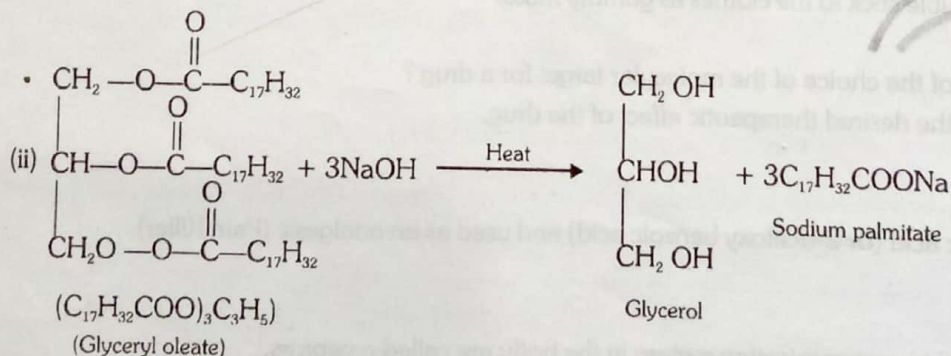
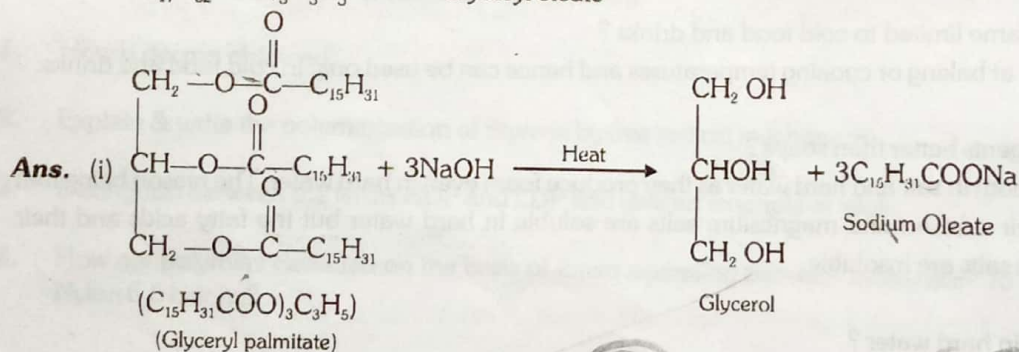
Ans. Mostly acetates or chlorides of quaternary amines.

**Short Answer Type Questions (2 mark)**

19. 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



20. What are fillers and what role do they play in soap ?

Ans. Some substances are added to soap to make it more useful for particular applications. e.g., sodium rosinate is added to laundry soap to increase its foaming capacity. Glycerol is added in shaving soaps to prevent them from rapid drying.



21. 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 metabolized and thus activates its receptor for longer periods of time thereby reducing depression. Two important drugs are iproniazid and phenelzine.

22. Why are cimetidine and ranitidine better antacids than sodium bicarbonate or magnesium or aluminium hydroxide?

**Ans.**  $\text{NaHCO}_3$  or  $\text{Mg(OH)}_2$  or  $\text{Al(OH)}_3$ , 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.

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

**Ans.** Detergents having straight hydrocarbon chain 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.

24. In order to wash clothes with water containing dissolved calcium hydrogencarbonate, which cleaning agent will you prefer and why: soaps or synthetic detergents? Give one advantage of soaps over synthetic detergents.

**Ans.** Calcium ions form insoluble calcium soaps which separate as scum in water, hence detergents are preferred. Soaps are biodegradable, detergents are not easily biodegradable.

25. Account for the following:

- (a) Aspirin drug helps in the prevention of heart attack.
- (b) Diabetic patients are advised to take artificial sweeteners instead of natural sweeteners.
- (c) Detergents are non-biodegradable while soaps are biodegradable.

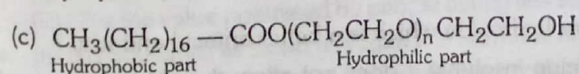
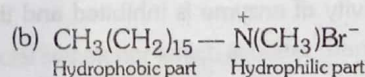
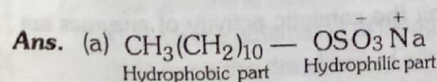
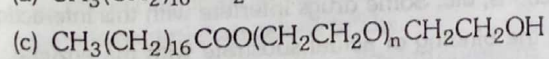
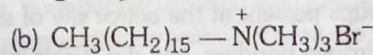
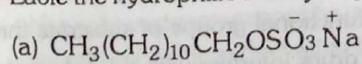
**Ans.** (a) Due to antiblood clotting action, aspirin is used for prevention of heart attacks.

(b) As artificial sweeteners provide less calories than natural sweeteners.

(c) Detergents have highly branched hydrocarbon chain, which cannot be degraded by bacteria, so they get accumulated while soap containing straight hydrocarbon chain can be degraded easily.

### Short Answer Type Questions (3 mark)

26. Label the hydrophilic and hydrophobic parts in the following compounds:

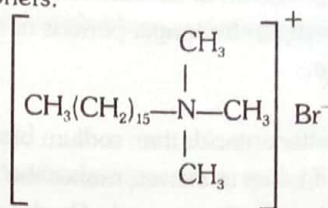


27. Explain the following types of substance with one suitable example, for each case:

- (i) Cationic detergents
- (ii) Food preservatives
- (iii) Analgesics



**Ans. (i) Cationic detergents:** Cationic detergents are quarternary ammonium salts or 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. Cetyltrimethylammonium bromide is a popular cationic detergent and is used in hair conditioners.



Cetyltrimethyl ammonium bromide

Cationic detergents have germicidal properties and are expensive, therefore, these are of limited use.

(ii) **Food preservatives:** These are the chemical substances which are added to the 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 preservations used are, sugar, table salt, sodium benzoate, Sodium metabisulphite, sorbic acid and propanoic acid.

(iii) **Analgesics:** Drugs which reduce or abolish pain without causing impairment of consciousness, mental confusion, incoordination or paralysis or some other disturbances of nervous system. These are classified as follow:

(a) **Non-narcotic (non-addictive) analgesics:** Aspirin, paracetamol, etc.

(b) **Narcotic drugs:** These are known to be habit forming, e.g., morphine, Codeine, Heroin etc.

**28.** Describe the following substances with one suitable example of each type:

(i) Non-ionic detergents

(ii) Disinfectants

(iii) Antipyretics

**Ans. (i) Non-ionic detergents:** These are the esters of high molecular mass alcohols with fatty acids. These are named so because they do not contain any ion in their constitution. E.g., polyethylene glycol stearate.

(ii) **Disinfectants:** These are the chemical substances which kill microorganisms or stop their growth but are harmful to human tissues, e.g., phenol (1%), chlorine in concentration of 0.2 to 0.4 ppm in aqueous solution,  $\text{SO}_2$ , etc.

(iii) **Antipyretics:** Substance which are used to decrease the elevated body temperature (fever) are called as antipyretics. **Ex.** Paracetamol.

**29.** Why are certain drugs called enzyme inhibitors?

**Ans.** Enzymes have active sites which binds the substrate for carrying out chemical reactions quickly and effectively. The functional groups present at the active site of enzyme interact with functional groups of substrate through ionic bonding, hydrogen bonding, van der Waals interactions, etc. Some drugs interfere with this interaction by blocking the binding site of enzyme thereby preventing the binding of actual substrate with the enzyme. As a result, catalytic activity of enzyme is inhibited and the drugs which inhibit the catalytic activity of enzymes are called **inhibitors**.

**30.** Between sodium hydrogen carbonate and magnesium hydroxide which is a better antacid and why?

**Ans.** Magnesium hydroxide is a better antacid because being insoluble it does not allow the pH to increase above neutrality. On the other hand, sodium hydrogen carbonate being soluble, its excess can make the stomach alkaline and trigger the production of even more acid.



## EXERCISE-1

### PREVIOUS YEARS BOARD PROBLEMS

#### CBSE 2016

1. Due to hectic and busy schedule, Mr. Awasthi made his life full of tensions and anxiety. He started taking sleeping pills to overcome the depression without consulting the doctor. Mr. Roy, a close friend of Mr. Awasthi advised him to stop taking sleeping pills and suggested to change his lifestyle by doing Yoga, meditation and some physical exercise. Mr. Awasthi followed his friend's advice and after few days he started feeling better. After reading the above passage, answer the following:
- What are the values (at least two) displayed by Mr. Roy?
  - Why it is not advisable to take sleeping pills without consulting doctor?
  - What are tranquilizers? Give two examples.

#### CBSE 2015

1. Seeing the growing cases of diabetes and depression among your children, Mr. Lugani, the principal of one reputed school organized a seminar in which he invited parents and principals. They all resolved this issue by strictly banning junk food in schools and introducing healthy snacks and drinks like soup, lassi, milk, etc. in school canteens. They also decided to make compulsory half an hour of daily physical activities for the students in the morning assembly. After six months, Mr. Lugani conducted the health survey in most of the schools and discovered a tremendous improvement in the health of the students. After reading the above passage, answer the following questions:
- What are the values (at least two) displayed by Mr. Lugani?
  - As a student, how can you spread awareness about this issue?
  - What are antidepressant drugs? Give an example.
  - Name the sweetening agent used in the preparation of sweets for a diabetic patient.

#### CBSE 2014

1. On the occasion of World Health Day, Dr. Satpal organized 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 the National Human Rights Commission (NHRC). On the suggestions of NHRC, the government decided to provide medical care, financial assistance, setting up of super-speciality hospitals for treatment and prevention of deadly disease in the affected villages all over India.
- Write the values shown by
    - Dr. Satpal
    - NHRC.
  - What type of analgesics are chiefly used for the relief of pains of terminal cancer?
  - Give an example of artificial sweetener that could have been recommended to diabetic patients.

#### CBSE 2013

1.
  - What class for drugs is ranitidine?
  - If water contains dissolved  $\text{Ca}^{2+}$  ions, out of soaps and synthetic detergents, which will you use for clearing clothes?
  - Which of the following is an antiseptic? 0.2% phenol, 1% phenol.

**CBSE 2012**

1. What is the cause of a feeling of depression in human beings? Name a drug which can be useful in treating depression.
2. Describe and illustrate with an example, a detergent.
3. Differentiate between disinfectants and antiseptics. Give one example of each group.
4. Explain the cleaning action of soap. Why do soaps not work in hard water?
5. What are food preservatives? Name two such substances.
6. How do antiseptics differ from disinfectants? Name a substance that can be used as an antiseptic as well as a disinfectant.

**CBSE 2011**

1. What is tincture of iodine and what is it used for?
2. Describe the following giving one example for each.  
(i) Detergents  
(ii) Food preservatives  
(iii) Antacids
3. Mention the action of the following on the human body in bringing relief from a disease  
(i) Bromopheniramine  
(ii) Aspirin  
(iii) Equanil

**CBSE 2010**

1. Define the following and give one example:  
Tranquilizers.
2. Describe the following types of substance, giving suitable examples:  
Antiseptics.
3. Explain the following terms with an example for each.  
(i) Antifertility drugs  
(ii) Antibiotics
4. Explain the following with one example each  
(i) Anionic detergents  
(ii) Chemotherapy
5. What are analgesics medicines? How are they classified and when are they commonly recommended for use?
6. Explain the following terms with one example in each case:  
(i) Food preservatives      (ii) Enzymes      (iii) Detergents
7. Explain the following terms with example of each  
(i) Cationic detergents  
(ii) Broad spectrum antibiotics  
(iii) Tranquilizers

**CBSE 2009**

1. Name a broad spectrum antibiotic and state two diseases for which it is prescribed.
2. Explain the following terms with one suitable example for each,  
(i) A sweetening agent for diabetic patients.  
(ii) Enzymes  
(iii) Analgesics



## EXERCISE-1

### SOLUTION PREVIOUS YEARS BOARD PROBLEMS

#### CHEMISTRY IN EVERYDAY LIFE

##### CBSE 2016

- Sol.1 (i) Aware, concerned or any other two correct values  
 (ii) Side effects/ health problems  
 (iii) Neurologically active drugs/ stress relievers/drugs used to treat mental diseases  
 example- valium, equanil (or any other two correct example)

##### CBSE 2015

- Sol.1 (i) Caring nature / Generous / Sensible human approach / empathy/ concern (any two)  
 (ii) By making posters & displaying them in school premises / by doing role play ( or any other correct answer)  
 (iii) Drugs which are used for the treatment of /counteract depression. eg: Rauwolfia serpentina / Barbituric acid / Equanil / Valium (Diazepam) / Chlordiazepoxide / meprobamate / iproniazid / phenelzine (any one example)  
 (iv) Saccharin / Aspartame / Alitame / Sucrolose / Cyclamate / L-Glucose (any one)

##### CBSE 2014

- Sol.1 (i) The government decided to provide medical care, financial assistance, setting up of super-speciality hospitals for treatment and prevention of the deadly disease in the affected villages all over India.  
 (ii) Narcotic e.g Morphine  
 (iii) Saccharine

##### CBSE 2013

- Sol.1 (i) The government decided to provide medical care, financial assistance, setting up of super-speciality hospitals for treatment and prevention of the deadly disease in the affected villages all over India.  
 (ii) Narcotic e.g Morphine  
 (iii) Saccharine

##### CBSE 2012

- Sol.1 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 metabolized and thus activates its receptor for longer periods of time thereby reducing depression. Two important drugs are iproniazid and phenelzine.  
 Sol.2 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.  
 Sol.3 Antiseptics are applied to living tissues such as wounds, cuts, ulcers and diseased skin surfaces. eg. soframycine. Disinfectants are applied to inanimate objects such as floors drainage system, instruments etc. eg. 1% phenol.

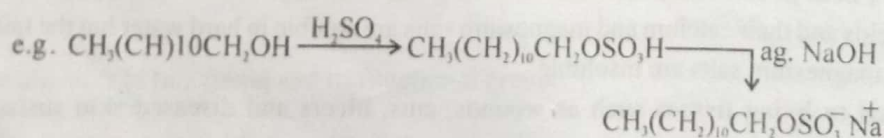
- Sol.4 Hard water contains calcium and magnesium salts. In hard water, soaps get precipitated as calcium and magnesium soaps which being insoluble stick to the clothes as gummy mass.
- Sol.5 Food preservatives → Sodium Benzoate and salt of sorbic and propanoic acid. It prevent the spoilage of food due to microbial growth.
- Sol.6 Same as Q.3 in 2012 and phenol

**CBSE 2011**

- Sol.1 2-3% solution of iodine in alcohol and water is called tincture of iodine. It is a powerful antiseptic. It is applied on wounds.
- Sol.2 (i) **Detergents** : Detergents may be defined as ammonium sulphate or hydrogen sulphate salts of long chain detergents are the sodium salts of long chain sulphonic acids.
- (ii) **Food preservatives** : Food preservatives are the substances used to prevent spoilage of food due to microbial growth during storage. The most common preservatives used are table salt, sugar, vegetable oils and sodium benzoate (C<sub>6</sub>H<sub>5</sub>COO<sup>-</sup>Na<sup>+</sup>).
- (iii) **Antacid** : Antacids are those substances which neutralise the excess acid and bring the pH to appropriate level in stomach.
- Sol.3 (i) Anti histamine  
(ii) Nor-narcotics, Analgesic  
(iii) Tranquilizers

**CBSE 2010**

- Sol.1 Tranquilizers are the drugs which are used for the treatment of stress, mild or even, servers mental diseases. These drugs relive strcees, irritability and anxiety by including a sence of well being.  
Ex. Iproniazil and phenilzile
- Sol.2 These are the chemicals which prenent either the growth of microorganisms or kill them but are not harmful to the living human tissues  
Ex. Soframycin and Furacine
- Sol.3 (i) Chemical substances which are used to prevent unwanted pregnancies in women are call antifortility drugs.  
e.g. → estrogen and progesterone.
- (ii) These durgs are chemcial substances which are produced by microorganisms. It used as drygs to treat infections because of their low foxicity for humans.
- Sol.4 (i) These are sodium salts of sulphonated long chain alcohols or hydrocarbons.



- (ii) Chemotherapy is the treatment of a disease with the helf of chemicals.



**Sol.5 Food preservatives:** These are the chemical substances which are added to the 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 preservations used are, sugar, table salt, sodium benzoate, Sodium metabisulphite, sorbic acid and propanoic acid.

**Sol.6 (i) Food preservatives :** Food preservatives are the substances used to prevent spoilage of food due to microbial growth during storage. The most common preservatives used are table salt, sugar, vegetable oils and sodium benzoate ( $C_6H_5COO^-Na^+$ ).

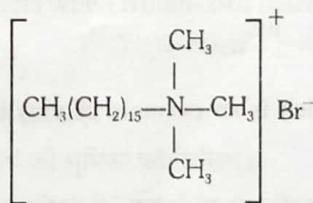
**(ii) Enzymes :** Most of the chemical reactions which occur in living systems process at very high rates even under mild conditions of temperature and pH. These reactions are catalysed by a group of biomolecules called **enzymes**.

**(iii) Detergents :** Detergents may be defined as ammonium sulphate or hydrogen sulphate salts of long chain detergents are the sodium salts of long chain sulphonic acids.

**Examples :**

Magnesium hydroxide and sodium bicarbonate.

**Sol.7 (i) Cationic detergents:** Cationic detergents are quarternary ammonium salts or 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. Cetyltrimethylammonium bromide is a popular cationic detergent and is used in hair conditioners.



Cetyltrimethyl ammonium bromide

Cationic detergents have germicidal properties and are expensive, therefore, these are of limited use.

**(ii) Broad spectrum antibiotic:** 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, dysentery, urinary infections, meningitis and pneumonia.

**(iii) Same as Q.1 in 2010**

**CBSE 2009**

**Sol.1** Same as **Q.7 (ii) in 2010**

**Sol.2 (i)** Saccharine

**(ii)** Same as **Q.6 (ii) in 2010**

**(iii)** Same as **Q.5 in 2010**