Chapter

30 Chemistry in Everyday Life

Drugs are chemicals of low molecular masses (~ 100 – 500u). They interact with macromolecular targets and produce a biological response. When the biological response is therapeutic and useful, these chemicals are called medicines and are used in diagnosis, prevention and treatment of diseases. If taken in doses higher than those recommended, most of the drugs used as medicines are potential poisons. *Use of chemicals for therapeutic effect is called chemotherapy.*

Note : Medicine is a chemical substance which cures the disease and is safe to use it does not cause any addiction whereas drug is a chemical substance which cures disease but it causes addiction and has serious side effects.

CLASSIFICATION OF DRUGS

(i) On the basis of pharmacological effect.
For example : analgesics have pain killing effect, antiseptics kill or arrest the growth of microorganisms.

(ii) On the basis of drug action i.e., action of drug on a particular biochemical process. For example : all antihistamines inhibit the action of the compound, histamine.

(iii) On the basis of chemical structure of the drug.

(iv) On the basis of molecular targets. Drugs usually interact with biomolecules such as carbohydrates, lipids, proteins and nucleic acids. These are called target molecules or drug targets. Drugs possessing some common structural features may have same mechanism of action on targets.

TYPES OF DRUGS

Antacids

They are used for the treatment of acidity (due to over production of acid in stomach).

For example : $NaHCO_3$, a mixture of $Al(OH)_3$ and $Mg(OH)_2$.

Metal hydroxides are better alternatives because they are insoluble and do not increase the pH above neutrality.

Antihistamines

The drugs which have been used to fight allergy are called **antihistamines**. These are so called because they check the production of histamines. Thus, antihistamines are widely used for treatment to hay fever, conjunctivitis, nasal discharges, irradiation sickness, nausea in pregnancy and post operative vomiting. For example : cimetidine, brompheniramine, terfenadine.

Neurologically Active Drugs

(i) **Tranquilizers:**
They are used for treatment of stress, and mild or even severe mental diseases. They relieve anxiety, stress, irritability or excitement by inducing a sense of well-being.
They also form an essential component of sleeping pills.
Example :
(a) **Noradrenaline** plays a role in mood changes.
(b) **Chlordiazepoxide** and **meprobamate** are suitable for relieving tension.
(c) **Equanil** is used in controlling depression and hypertension.
(d) **Barbiturates**, i.e., derivatives of barbituric acid like veronal, amytal, nembutal, luminal and seconal. They are hypnotic i.e., sleep producing agents.

(ii) **Analgesics :** They reduce or abolish pain without causing impairment of consciousness, mental confusion, incoordination or paralysis or some other disturbances of nervous system.

Non-narcotic analgesics	**Narcotic analgesics**
(a) They relieve skeletal pain, reduce fever (antipyretic). Ex: aspirin, paracetamol	(a) Relieve pain and produce sleep.
(b) Aspirin is used in prevention of heart attacks due to anti blood clotting action.	(b) Chiefly used for relief of postoperative pain, cardiac pain and pains of terminal cancer and in child birth. Ex: morphine, heroin, codeine

Antimicrobials

They tend to destroy / prevent development or inhibit the pathogenic action of microbes such as bacteria, fungi, virus or other parasites selectively. Antibiotics, antiseptics and disinfectants are antimicrobial drugs.

Antibiotics

They are used to treat infections due to their low toxicity for humans and animals. An antibiotic refers to a substance produced wholly or partly by chemical synthesis, which in low concentrations inhibits the growth or destroys micro-organisms by intervening in their metabolic processes.

For example : sulphanilanide, sulphapyridine, etc.

Types of antibiotics

Antibiotics which kill or inhibit a wide range of Gram-positive and Gram-negative bacteria are said to be **broad spectrum antibiotics**. For example : chloramphenicol, vancomycin, Ampicilin, Amoxycilin, etc.

Antibiotics effective few Gram-positive or Gram-negative bacteria are **narrow spectrum antibiotics**. For example : penicillin.

If effective against a single organism or disease, they are referred as **limited spectrum antibiotics**.

Antiseptic and disinfectants

Antiseptics are applied to living tissues such as wounds, cuts, ulcers and diseased skin surfaces.

Examples :

(i) furacine, soframicine, dettol (mixture of chloroxylenol and terpeniol)
(ii) Bithional is added to soaps to impart antiseptic properties.
(iii) Tincture of iodine (2-3% solution of iodine in alcohol-water mixture) is applied on wounds.
(iv) Iodoform is also used on wounds.
(v) Boric acid in dilute aqueous solution is weak antiseptic for eyes.

Disinfectants are applied to inanimate objects such as floors, drainage system, instruments etc. For example : Chlorine in concentration of 0.2 to 0.4 ppm in aqueous solution and SO_2 in very low concentrations, are disinfectants. Same substances can act as an antiseptic as well as disinfectant by varying the concentration. For ex: 0.2% solution of phenol is an antiseptic while its 1% solution is disinfectant.

Antifertility Drugs

They are also called birth control pills. They essentially contain a mixture of synthetic estrogen and progesterone. Both of these compounds are hormones.

Example : Norethindrone, ethynylestradiol (novestrol)

Antimalarials

Chemical substances which are used to bring down the body temperature during malaria fever are called *antimalarials*. These are *Chloroquine*, *Paraquine*, *Primaquine* etc.

CHEMICALS IN FOOD

Chemicals are added to food for

(i) their preservation
(ii) enhancing their appeal
(iii) adding nutritive value in them.

Artificial Sweetening Agents

These are of use to diabetic patients and people who need to control intake of calories.

For example :

(i) saccharin (ortho-sulphobenzimide)
(ii) asparatame (added to cold foods and soft drinks as it is unstable at cooking temperature)
(iii) alitame
(iv) sucralose (trichloro derivative of sucrose)

Food Preservatives

They prevent spoilage of food due to microbial growth.

For example : table salt, sugar, vegetable oils, salts of sorbic acid and propanoic acid and sodium benzoate (C_6H_5COONa)

Note : Sodium benzoate is used in limited quantities and is metabolised in the body.

CLEANSING AGENTS

Two types of detergents are used as cleansing agents: soaps and synthetic detergents. They improve cleansing properties of water by helping in removal of fats which bind other materials to the fabric or skin.

Soaps

They are sodium or potassium salts of long chain fatty acids, ex: stearic, oleic and palmitic acids. Only Na and K-soaps are soluble in water and are used for cleaning purposes. K-soaps are comparatively soft to the skin than Na-soaps. Alkaline hydrolysis of oils or fats by NaOH or KOH gives glycerol and sodium or potassium salt of the fatty acid. This reaction is known as **saponification**.

$$\begin{array}{l} CH_2OCOC_{17}H_{35} \\ | \\ CHOCOC_{17}H_{35} + 3NaOH \\ | \\ CH_2OCOC_{17}H_{35} \end{array} \longrightarrow \begin{array}{l} CH_2OH \\ | \\ CHOH \\ | \\ CH_2OH \end{array} + 3C_{17}H_{35}COONa \text{ (sodium stearate)}$$

Soaps do not work in hard water. This is because hard water contains calcium and magnesium ions. These ions form insoluble Ca– and Mg soaps when Na or K soaps are dissolved in hard water. These insoluble soaps separate as scum in water and are useless as cleansing agents.

Note : Hair washed with hard water looks dull due to sticky ppt. Dye does not absorb evenly or cloth washed with soap using hard water because of gummy mass.

Synthetic Detergents

They can be used in both soft and hard water as they give foam even in hard water.

They are classified into three categories:

(i) **Anionic detergents:**
These are sodium salts of sulphonated long chain alcohols or hydrocarbons. The anionic part of the molecule is involved in cleansing action. They are used for household work and also in toothpastes.
For example : sodium laurylsulphate, sodium salts of alkylbenzene-sulphonates.

(ii) **Cationic detergents :** These are quarternary ammonium salts of amines with acetates, chlorides or bromides as anions. Cationic part possess a long hydrocarbon chain and a positive charge on N-atom. Hence, the name. They have germicidal properties and are expensive.
For example : cetyltrimethyl ammonium bromide, used in hair conditioners.

(iii) **Non-ionic detergents**
They do not contain any ion in their composition. Liquid dishwashing detergents are non-ionic type.
ex: $CH_3(CH_2)_{16}COO(CH_2CH_2O)_n\,CH_2CH_2OH$
Note : As the hydrocarbon chain of the detergent becomes branched, degradation becomes difficult which leads to their accumulation and hence pollution.

CONCEPT MAP

CHEMISTRY IN EVERYDAY LIFE

Classification of Drugs

- **Based on pharmacological effect :** It is useful for doctors.
- **Based on drug action :** Drugs which act on a particular biochemical process are kept under one class.
- **Based on Chemical Structure** Drugs having common structural features are grouped together in one class
- **Based on molecular target** useful for medicinal chemists.

Different types of Drugs

- **Antacids :** Control stomach acidity e.g. $Mg(OH)_2$
- **Antihistamines :** Used to treat allergy e.g. cetrizine
- **Tranquilizers :** Used for treatment of stress and mental diseases e.g. equanil
- **Analgesics :** For relieving pain e.g. aspirin
- **Antibiotics :** (a) Bactericidal destroy microbes e.g. penicilin
  (b) Bacteriostatic : Inhibit growth of microbes e.g. Chloramphenicol
- **Antiseptics :** May kill or stop growth of microbes e.g. dettol.
- **Antifertility :** Control menstrual cycle and ovulation of females
- **Artificial Sweetners :** e.g. Saccharin, Alitame etc.
- **Food Preservatives :** Prevent decaying of food e.g. sodium Benzoate.

Soaps and Detergents

Soaps

- Sodium or Potassium salts of long chain fatty acids
- **Types of Soaps**
  (a) Toilet soaps
  (b) Floating soaps
  (c) Medicated soaps
  (d) Transparent soaps
  (e) Shaving soaps
  (f) Laundary soaps

Detergents

- Sodium salts of alkylbenzene sulphonic acids.
- **Types of detergents**
  (a) Anionic
  (b) Cationic
  (c) Non-ionic

EXERCISE - 1
Conceptual Questions

1. Synthetic detergents are more effective in hard water than soaps because
(a) they are non-ionic
(b) their Ca^{++} and Mg^{++} salts are insoluble in water
(c) their Ca^{++} and Mg^{++} salts are water soluble
(d) they are highly soluble in water

2. Aspirin is
(a) antibiotic (b) antipyretic
(c) sedative (d) psychedelic

3. An antipyretic is
(a) quinine (b) paracetamol
(c) luminal (d) piperazine

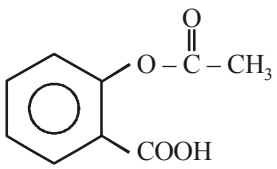
4. Salol can be used as
(a) antiseptic (b) antipyretic
(c) analgesic (d) None of these

5. Which of the following is used as a 'morning after pill'
(a) Norethindrone (b) Ethynylestradiol
(c) Mifepristone (d) Bithional

6. Various phenol derivatives, tincture of iodine (2 – 3%) I_2 in (water / alcohol) and some dyes like methylene blue are
(a) antiseptics (b) disinfectants
(c) analgesics (d) antipyretics

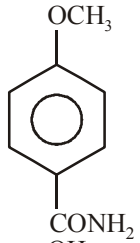
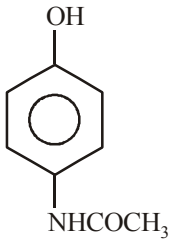
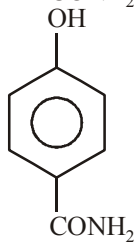
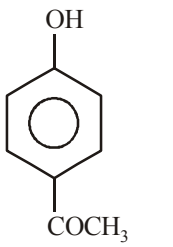
7. The insecticide containing 99% γ – isomer of benzene hexachloride is known as
(a) lindane (b) TNT
(c) malathion (d) methoxychlor

8. The following compound is used as

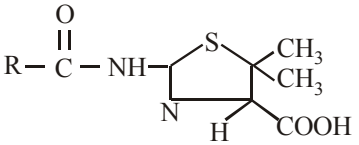


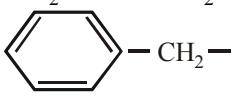
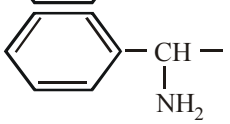
(a) an anti-inflammatory compound
(b) analgesic
(c) hypnotic
(d) antiseptic

9. The correct structure of the drug paracetamol is

(a) 
(b) 
(c) 
(d) 

10. The general structure of penicillin is



In ampicillin R =
(a) $CH_3(CH_2)_6$–
(b) $-CH_2-CH=CH-CH_2-CH_3$
(c) 
(d) 

11. Amoxillin is semi-synthetic modification of
(a) penicillin (b) streptomycin
(c) tetracycline (d) chloroampheniol

12. Which of these is a hypnotic
(a) metaldehyde (b) acetaldehyde
(c) paraldehyde (d) None of these

13. Barbituric acid and its derivatives are well known
(a) antipyretics (b) analgesics
(c) antiseptics (d) traquillizers

14. The drug used for prevention of heart attacks is
(a) aspirin (b) valium
(c) chloramphenicol (d) cephalsoprin

15. Serotonin is usually used as :
(a) analgesic (b) tranquilizer
(c) antiseptic (d) antioxidant

16. Omeoprazole and lansoprazole are used as –
(a) antifertility (b) antiallergic
(c) antibiotic (d) antacid

17. Sulpha drugs are used for
(a) precipitating bacteria
(b) removing bacteria
(c) decreasing the size of bacteria
(d) stopping the growth of bacteria

18. Which one of the following is an antihistamine?
(a) Iproniazid (b) Salvarsan
(c) Zantac (d) Chloramphenicol

19. Chloramine-T is a/an
(a) disinfectant (b) antiseptic
(c) analgesic (d) antipyretic

20. Which of the following is a hypnotic drug?
(a) luminal (b) salol
(c) catechol (d) chemisol

21. Streptomycin is effective in the treatment of
(a) tuberculosis (b) malaria
(c) typhoid (d) cholera

22. An antibiotic with a broad spectrum
(a) kills the antibodies
(b) acts on a specific antigen
(c) acts on different antigens
(d) acts on both the antigens and antibodies

23. Chloramine-T is used as an :
(a) analgesic (b) antiseptic
(c) antipyretic (d) anti-inflamatory

24. Which of the following is not an antiseptic drug?
(a) Iodoform (b) Dettol
(c) Gammexane (d) Genation violet

25. A medicine which promotes the secretion of urine is called
(a) uretic (b) monouretic
(c) diuretic (d) triuretic

26. Veronal, a barbiturate drug is used as
(a) anaesthetic (b) sedative
(c) antiseptic (d) None of these

27. A drug effective in the treatment of pneumonia, bronchitis, etc, is
(a) streptomycin (b) chloramphenicol
(c) penicillin (d) sulphaguanidine

28. The use of chemicals for treatment of diseases is called as
(a) isothermotherapy (b) angiotherapy
(c) physiotherapy (d) chemotherapy

29. Select the incorrect statement.
(a) Equanil is used to control depression and hypertension.
(b) Mifepristone is a synthetic steroid used as "morning after pill".
(c) 0.2 per cent solution of phenol is an antiseptic while its 1.0 per cent solution is a disinfectant.
(d) A drug which kills the organism in the body is called bacteriostatic.

30. Terfenadine is commonly used as a/an
(a) tranquilizer (b) antihistamine
(c) antimicrobial (d) antibiotic

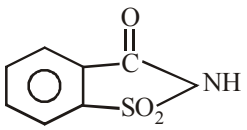
31. Structuraly biodegradable detergent should contain
(a) normal alkyl chain (b) branched alkyl chain
(c) phenyl side chain (d) cyclohexyl side chain

32. Detergents are prepared by the action of H_2SO_4 on which of the following?
(a) Cholesterol (b) Lauryl alcohol
(c) Cyclohexanol (d) *p*-Nitrophenol

33. Arsenic containing medicine used for the treatment of syphilis, is
(a) erythromycin (b) ofloxacin
(c) tetracycline (d) salvarsan

34. Sodium alkyl benzene sulphonate is used as
(a) soap (b) fertilizers
(c) pesticides (d) detergents

35. Which is correct about vanillin?
(a) A flavouring agent having vanila flavour
(b) *p*-hydroxy-*m*-methoxy benzaldehyde
(c) A food additive
(d) All of these

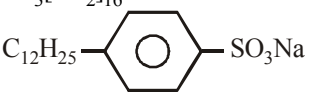
36. Which is correct about saccharin?
(a) It is 
(b) It is 600 times sweeter than sugar
(c) It is used as sweetening agent
(d) All of these

37. Which of the following acts as an antioxidant is edible oils
(a) Vitamin B (b) Vitamin C
(c) Vitamin D (d) Vitamin E

38. Which of the following is used as an antioxidant in food?
(a) BTX (b) BHT
(c) BHC (d) All the three

39. End of detergents have
(a) ester group (b) sodium sulphate
(c) aldehyde (d) amine group

40. Which one of the following is not a tranquilizer?
(a) Equanil (b) Veronal
(c) Salvarsan (d) Serotonin

41. Which of the following represents a synthetic detergent?
(a) $C_{15}H_{31}COOK$
(b) $CH_3[CH_2]_{16}COONa$
(c) 
(d) None of these

42. Which of the following represents soap
(a) $C_{17}H_{35}COOK$ (b) $C_{17}H_{35}COOH$
(c) $C_{15}H_{31}COOH$ (d) $(C_{17}H_{35}COO)_2Ca$

43. Benzalkonium chloride is a
(a) cationic surfactant and antiseptic
(b) anionic surfactant and soluble in most of organic solvents
(c) cationic surfactant and insoluble in most of organic solvents
(d) cationic surfactant and antimalarial

44. Cetyltrimethyl ammonium bromide is a popular
(a) anionic detergent (b) cationic detergent
(c) non-ionic detergent (d) sweetener

45. Commonly used antiseptic 'Dettol' is a mixture of
(a) *o*-chlorophenozylenol + terpeneol
(b) *o*-cresol + terpeneol
(c) phenol + terpeneol
(d) chloroxylenol + terpeneol

46. Which one of the following is employed as a tranquilizer drug?
(a) Promethazine (b) Valium
(c) Naproxen (d) Mifepristone

47. Which one of the following is employed as Antihistamine ?
(a) Chloramphenicol (b) Diphenylhydramine
(c) Norothindrone (d) Omeprazole

48. Aspirin is known as :
(a) acetyl salicylic acid (b) phenyl salicylate
(c) acetyl salicylate (d) methyl salicylic acid

49. Which one among the following is not an analgesic?
(a) Ibuprofen (b) Naproxen
(c) Aspirin (d) Valium

50. Further growth of cancerous cells in the body is arrested by
(a) physiotherapy (b) chemotherapy
(c) electrotherapy (d) psychotherapy

EXERCISE - 2
Applied Questions

1. Which one of the following is not used as a filler in laundry soaps?
(a) Sodium silicate (b) Glycerol
(c) Sodium rosinate (d) Borax

2. The drug which is effective in curing malaria is
(a) quinine (b) aspirin
(c) analgin (d) equanil

3. Which of the following is a hallucinogenic drug?
(a) Methedrine (b) Calmpose
(c) LSD (d) Seconal

4. Which one of the following is not a neurologically active drug?
(a) Veronal (b) Bithionol
(c) Equanil (d) Nardil

5. Interferon is connected with
(a) tonic (b) virus
(c) carbohydrate (d) ore of iron

6. Which of the following statements about aspirin is **not** true?
(a) It is effective in relieving pain.
(b) It is a neurologically active drug.
(c) It has antiblood clotting action.
(d) It belongs to narcotic analgesics.

7. Which of the following is an alkaloid?
(a) Nicotine (b) Piperine
(c) Cocaine (d) All of these

8. Phenacetin is used as
(a) antipyretic (b) antiseptic
(c) antimalarial (d) analgesic

9. The artificial sweetener containing chlorine that has the appearance and taste as that of sugar and is stable at cooking temperature is
(a) Aspartame (b) Saccharin
(c) Sucrolose (d) Alitame

10. Morphine is
(a) an alkaloid (b) an enzyme
(c) a carbohydrate (d) a protein

11. A large number of antibiotics have been isolated from
(a) Bacteria actinomycetes
(b) Acids
(c) Alkanals
(d) Bacteria rhizobium

12. An antibiotic contains nitro group attached to aromatic nucleus. It is
(a) penicillin
(b) streptomycin
(c) tetracycline
(d) chloramphenicol

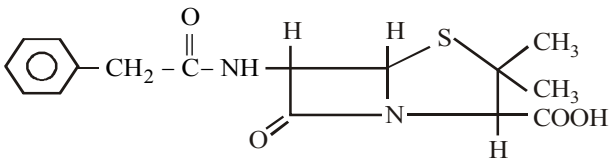
13. The cationic detergent that is used in hair conditioners is
(a) sodium dodecylbenzene sulphonate
(b) sodium lauryl sulphate
(c) tetramethyl ammonium chloride
(d) cetyltrimethyl ammonium bromide

14. Placebo is often given to patients. It is
(a) an antidepressant
(b) a broad spectrum antibiotic
(c) a sugar pill
(d) a tonic

15. Sulphaguadine is used for
(a) aysentery (b) urinary infections
(c) antiseptic (d) antipyretic

16. Salts of sorbic acid and propionic acid are used as
(a) antioxidants
(b) flavouring agents
(c) food preservatives
(d) nutritional supplements

17. The structure given below is known as



(a) Penicillin F (b) Penicillin G
(c) Penicillin K (d) Ampicillin

18. Consider the following antibiotics.
(i) Erythromycin (ii) Ofloxacin
(iii) Chloramphenicol (iv) Penicillin
(v) Tetracycline
The pair of bactericidal antibiotics is
(a) i-iii (b) ii-iv
(c) iii-v (d) i-iv

19. Match the chemicals in Column I with their uses in Column II.

	Column I		Column II
(A)	Sodium Perborate	(I)	Disinfectant
(B)	Chlorine	(II)	Antiseptic
(C)	Bithional	(III)	Milk bleaching agent
(D)	Potassium stearate	(IV)	Soap

(a) A - I, B - II, C - III, D - IV

(b) A - II, B - III, C - IV, D - I

(c) A - III, B - I, C - II, D - IV

(d) A - IV, B - I, C - II, D - III

20. Bithional is added to soap as an additive to function as a/an

(a) softener (b) hardener

(c) dryer (d) antiseptic

DIRECTIONS for Qs. 21 to 25 : These are Assertion-Reason type questions. Each of these question contains two statements : Statement-1 (Assertion) and Statement-2 (Reason). Answer these questions from the following four options.

(a) Statement-1 is true, Statement-2 is true, Statement-2 is a correct explanation for Statement-1

(b) Statement-1 is true, Statement-2 is true ; Statement-2 is NOT a correct explanation for Statement-1

(c) Statement-1 is true, Statement-2 is false

(d) Statement-1 is false, Statement-2 is true

21. Statement-1 : The drugs which act on the central nervous system and help in reducing anxiety are called antibiotics.

Statement-2 : Pencillin is an antibiotic.

22. Statement-1 : Equanil is a tranquilizer.

Statement-2 : Equanil is used to cure depression and hypertension.

23. Statement-1 : Tetracycline is a broad spectrum antibiotic.

Statement-2 : Tetracyclin is effective against a number of types of bacteria, large viruses and typhus fever.

24. Statement-1 : Antiseptics are applied to living tissues.

Statement-2 : Iodine is a powerful antiseptic.

25. Statement-1 : Sedatives are given to patients who are mentally agitated and violent.

Statement-2 : Sedatives are used to suppress the activities of central nervous system.

EXERCISE - 3
Exemplar & Past Years NEET/AIPMT Questions

Exemplar Questions

1. Which of the following statements is not correct?

(a) Some antiseptics can be added to soaps

(b) Dilute solutions of some disinfectants can be used as antiseptic

(c) Disinfectants are antimicrobial drugs

(d) Antiseptic medicines can be ingested

2. Which is the correct statement about birth control pills?

(a) Contain estrogen only

(b) Contain progesterone only

(c) Contain a mixture of estrogen and progesterone derivatives

(d) Progesterone enhances ovulation

3. Which statement about aspirin is not true?

(a) Aspirin belong to narcotic analgesics

(b) It is effective in relieving pain

(c) It has antiblood clotting action

(d) It is a neurologically active drug

4. The most useful classfication of drugs for medicinal chemists is ..... .

(a) on the basis of chemical structure

(b) on the basis of drug action

(c) on the basis of molecular targets

(d) on the basis of pharmacological effect

5. Which of the following statements is correct?

(a) Some tranquilizers function by inhibiting the enzymes which catalyse the degradation of noradrenaline

(b) Tranquilizers are narcotic drugs

(c) Tranquilizers are chemical compounds that do not affect the message transfer from nerve to receptor

(d) Tranquilizers are chemical compounds that can relieve pain and fever

6. Salvarsan is arsenic containing drug which was first used for the treatment of ..... .

(a) syphilis (b) typhoid

(c) meningitis (d) dysentery

7. A narrow spectrum antibiotic is active against ..... .

(a) gram positive or gram negative bacteria

(b) gram negative bacteria only

(c) single organism or one disease

(d) both gram positive and gram negative bacteria

8. The compound that causes general antidepressant action on the central nervous system belong to the class of .....

(a) analgesics (b) tranquilizers

(c) narcotic analgesics (d) antihistamines

9. Compound which is added to soap to impart antiseptic properties is .....
(a) sodium lauryl sulphate
(b) sodium dodecylbenzenesulphonate
(c) rosin
(d) bithional

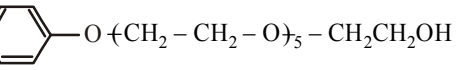
10. Equanil is .....
(a) artificial sweetener (b) tranquilizer
(c) antihistamine (d) antifertility drug

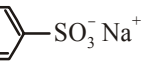
11. Which of the following enhances leathering property of soap?
(a) Sodium carbonate (b) Sodium rosinate
(c) Sodium strearate (d) Trisodium phosphate

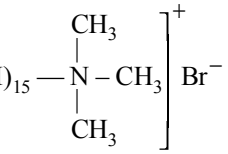
12. Glycerol is added to soap. It functions .....
(a) as a filler (b) to increase leathering
(c) to prevent rapid drying (d) to make soap granules

13. Which of the following is an example of liquid dishwashing detergent?

(a) $CH_3(CH_2)_{10}-CH_2OSO_3^- Na^+$

(b) 

(c) 

(d) 

14. Polyethyleneglycols are used in the preparation of which type of detergents?
(a) Cationic detergents
(b) Anionic detergents
(c) Non - ionic detergents
(d) Soaps

15. Which of the following is not a target molecule for drug function in body?
(a) Carbohydrates (b) Lipids
(c) Vitamins (d) Proteins

16. Which of the following statements is not true about enzyme inhibitors?
(a) Inhibit the catalytic activity of the enzyme
(b) Prevent the binding of substrate
(c) Generally a strong covalent bond is formed between an inhibitor and an enzyme
(d) Inhibitors can be competitive or non – competitive

17. Which of the following chemicals can be added for sweetening of food items at cooking temperature and does not provides calories?
(a) Sucrose (b) Glucose
(c) Aspartame (d) Sucralose

18. Which of the following will not enhance nutritional value of food?
(a) Minerals (b) Artificial sweetners
(c) Vitamins (d) Amino acids

NEET/AIPMT (2013-2017) Questions

19. Antiseptics and disinfectants either kill or prevent growth of microorganisms. Identify which of the following statements **is not true:** *[2013]*
(a) Chlorine and iodine are used as strong disinfectants.
(b) Dilute solutions of boric acid and hydrogen peroxide are strong antiseptics.
(c) Disinfectants harm the living tissues.
(d) A 0.2% solution of phenol is an antiseptic while 1% solution acts as a disinfectant.

20. Dettol is the mixture of *[1996, NEET Kar. 2013]*
(a) Terpineol and Bithionol
(b) Chloroxylenol and Bithionol
(c) Chloroxylenol and Terpineol
(d) Phenol and Iodine

21. Artificial sweetner which is stable under cold conditions only is :- *[2014]*
(a) Saccharine (b) Sucralose
(c) Aspartame (d) Alitame

22. Bithional is generally added to the soaps as an additive to function as a/an : *[2015]*
(a) Dryer (b) Buffering agent
(c) Antiseptic (d) Softner

23. Which of the following is an analgesic? *[2016]*
(a) Novalgin (b) Penicillin
(c) Streptomycin (d) Chloromycetin

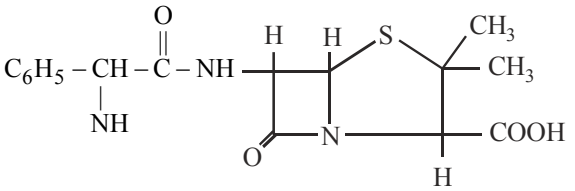
24. Mixture of chloroxylenol and terpineol acts as: *[2017]*
(a) antiseptic (b) antipyretic
(c) antibiotic (d) analgesic

Hints & Solutions

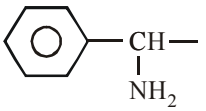
EXERCISE - 1

1. (c) Structural features of soaps and detergents are almost same except that the polar end in detergents is $-OSO_3^-Na^+$ while in soaps polar end is $-COO^-Na^+$. Detergents have an advantage over soaps that its polar end sulphate and sulphonate retain their efficiency in hard water, since the corresponding Ca and Mg salts are soluble. Being salts of strong acids, they yield neutral solution, in contrast, to the soaps, which being salts of weak acids yield slightly alkaline solutions.
2. (b) Aspirin is antipyretic i.e., a drug which is responsible for lowering the temperature of feverish organism to normal, other antipyretic drugs are Paracetamol, Phenacetin.
3. (b) Paracetamol is an antipyretic
4. (a) Salol is Phenyl Salicylate used as antiseptic.
5. (c) It is correct answer.
6. (a) Antiseptic drugs cause destruction of micro-organism that produce septic disease e.g. Dettol, Savlon, Boric acid, Phenol, Iodoform, $KMnO_4$ and some dye such as methylene blue, genation violet.
7. (a) Lindane or gammexane is γ isomer of BHC.
8. (b) It is acetyl salicylic acid i.e., aspirin analgesic and antipyretic.
9. (b) Paracetamol act as analgesic and antipyretic.
10. (d) Ampicillin is a semi-synthetic modification of pencillin.

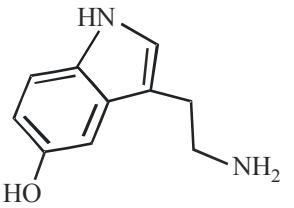
    Chemical structure of ampicillin is



    So, an comparing it with general structure of pencillin

    we found that R is 

11. (a) Amoxillin is semisynthetic modification of Penicillin
12. (c) Paraldehyde is a hypnotic.
13. (d)
14. (a) Due to anti-blood clotting action of aspirin, it is used to prevent heart attack.
15. (a) Serotonin is 5- hydroxytrptamine (or 5-HT) is a monoamine neurotransmitter synthesized in serotonergic neurons in the central nervous system (CNS) and enterochromaffin cells in the gastrointestinal tract of animals including humans . Cerebral serotonin has anti-depressant and analgesic effects and there have been reports that cerebral serotonin can be released by the stimulation of certain acupuncture points



    $C_{10}H_{12}N_2O$

16. (d) Antacid decreases acidity in stomach.
17. (d) Sulpha drugs (antibacterial and antibiotic) are group of drugs which are derivative of sulphanilamide.
18. (c) Iproniazid → Tranquilizer

    Salvarsan → Antimicrobial

    Zantac (ranitidine) → Antihistamine

    Chloramphenicol → Antibiotic
19. (b) Antiseptic drugs causes destruction of micro-organism that produce septic disease e.g. Dettol, Savlon, acriflavin, Boric acid, Phenol, Iodoform, $KMnO_4$ and some dyes such as Chloramine T, methylene blue.
20. (a) These drugs induce sleep and are habit forming common example of hypnotic drugs are Luminal and Saconal.
21. (a) It is the very effective antibiotic for tuberculosis.
22. (c) Broad spectrum antibiotics act on different antigens.
23. (b) Chloramin - 'T' is used as antiseptic.
24. (c) It is an insecticide.
25. (c) 26. (b)
27. (c) Penicillin is an effective medicine for Pneumonia disease.
28. (d)
29. (d) Bacteriostatic drugs inhibit the growth of organism while bactericidal drugs kill the microorganisms.

30. (b) Terfenadine is commonly used as antihistamine.

31. (b) Structurally biodegradable detergents should contain branched alkyl chain.

32. (b) 33. (d)

34. (d) It is used as detergent.

35. (d) All are characteristics of Vanillin.

36. (d) All are characteristics of Saccharin.

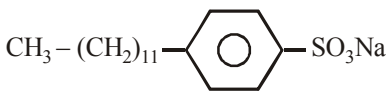
37. (d) Vitamin E is an antioxidant present in edible oils.

38. (b)

39. (b) A detergent molecule consists of a large hydrocarbon group that is non-ionic and a sulphonate ($SO_3^-Na^+$) or a sulphate ($SO_4^-Na^+$) group that is ionic. Examples of detergents are sodium-n-dodecyl benzene sulphonate, sodium dodecyl sulphate etc.

40. (c) Salvarsan is an organoarsenic compound, used in the treatment of syphilis. It was the first modern chemotherapeutic agent.

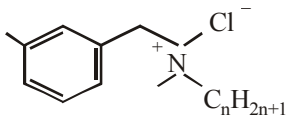
41. (c) The most widely used domestic detergent is the sodium dodecyl benzene sulphonate (SDS).



(Sodium dodecyl benzene sulphonate)

42. (a) Soaps are the sodium or potassium salt of higher fatty acids e.g., $C_{17}H_{37}COOK$ (Potassium stearate). These are obtained by alkaline hydrolysis of oils and fats. The reaction is called saponification.

43. (a) Benzalkonium chloride, also known as alkyldimethylbenzylammonium chloride is nitrogenous cationic surface active agent belonging to the quaternary ammonium group. It is used as antiseptic.



n = 8, 10, 12, 14, 16, 18

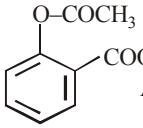
44. (b) Cetyltrimethyl ammonium bromide which is a germicide, is a popular cationic detergent.

45. (d) The mixture of chloroxylenol and terpenol is dettol which is used as antiseptic.

46. (b)

47. (b) Diphenyl hydramine also known as (Banadry) is an antihistamine.

48. (a)



Aspirin (Acetyl salicylic acid)

49. (d) Valium is a tranquilizer and not an analgesic. It is used for treatment of stress, fatigue, mild and severe mental diseases.

50. (b) Paul Ehrlich, the father of chemotherapy defined it to injure or destroy infection caused by microorganism by the use of drugs without causing any injury to the host.

EXERCISE - 2

1. (b) Laundry soaps contain fillers like sodium rosinate, sodium silicate, borax and sodium carbonate.

2. (a) Substances used for the treatment of malaria are antimalarial e.g. Quinine, chloroquine.

3. (c)

4. (d) Bithional is an antiseptic drug.

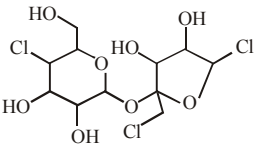
5. (b)

6. (d) Aspirin is an non-narcotics analgesic.

7. (d) All these are alkaloids.

8. (a)

9. (c)

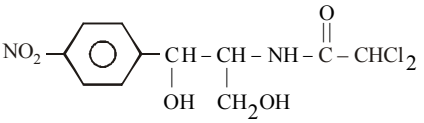


Sucrolose

10. (a) It is an alkaloid, a class of organic compound which is basic in nature and of plant origin containing atleast one nitrogen atom in a ring structure of molecule.

11. (a)

12. (d) Chloramphenicol is



13. (d) Cetyltrimethyl ammonium bromide possess germicidal properties. Thus it is used as a cationic detergent in hair conditioners.

14. (c) 15. (a)

16. (c) Salts of sorbic acid and propionic acid are used as food preservatives because these chemicals inhibit the growth of yeast bacteria or moulds.

17. (b) It is the known structure of Penicillin G

18. (b)

19. (c) The correct matching is as follows :

	Column I	Column II
(A)	Sodium Perborate	Milk bleaching agent
(B)	Chlorine	Disinfectant
(C)	Bithional	Antiseptic
(D)	Potassium stearate	Soap

20. (d) Bithional is another well known antiseptic which is added to good quality soaps to reduce the odours produced by bacterial decomposition of organic matter on the skin.

21. (d) The drugs which act on the central nervous system and help in reducing anxiety are called tranquilizers.

22. (a) Tranquilizers are chemicals which are used to cure mental diseases.

23. (a) Broad spectrum antibiotics are those medicines which are effective against several different types of harmful micro organisms.

24. (b) Antiseptics are those chemical which kill or prevent the growth of micro organism. Antiseptics do not harm the living tissues and can be applied on cuts and wounds. They help to reduce odour resulting from the bacterial decomposition in the mouth and on the body.

25. (a) A small quantity of sedative produces a feeling of relaxation, calmness and drowsiness.

EXERCISE - 3

Exemplar Questions

1. (d) Antiseptic is an antimicrobial drug which tends to inhibit the pathogenic action of microbes. They are applied to the living tissues such as wounds, cuts ulcers and diseased skin surface.

So, antiseptic medicines cannot be ingested like antibiotics.

2. (c) Birth control pills contain a mixture of synthetic estrogen and progesterone derivatives. These are sex hormones. Progesterone suppresses ovulation and estrogen control the menstrual cycle.

3. (a) Aspirin inhibits the synthesis of prostaglandins which stimulate inflammation in the tissues and cause pain. So, it is effective in relieving pain as it does not make a person addictive and known to be a non-narcotic drug.

4. (c) Classification on the basis of molecular target: drug usually interact with the biomolecules or biological macromolecules such as proteins, nucleic acids and lipids. These are called drug tagets. Drug possessing some common structural features may have the same mechanism of action on a specific drug target. This classification is most useful fo the medicinal chemists.

5. (a) Due to the low level of noradrenaline in the body the message transfer process becomes slow and the person suffers from depression. In such cases, tranquilizers are used. These drugs inhibits the enzymes which catalyse the degradation of noradrenaline.

If the enzyme is inhibited, then the neurotransmitter noradrenaline is slowly metabolised and can thus activate the receptor for longer periods thereby counteracting the effect of depression.

6. (a) Paul Ehrlich first synthesised arsenic based structures in order to produce less toxic substances for the treatment of syphilis. Salvarsan also known as arsphenamine was the first effective medicine discovered for syphilis. Salvarsan is toxic to human beings, but its effect on bacteria is much greater than on human being.

7. (a) Broad spectrum antibiotics are effective against a wide range of gram-positive and gram-negative bacteria whereas narrow spectrum antibiotics are effective mainly penicillin- G, against gram-positive or gram-negative bacteria antibiotic is a narrow spectrum antibiotic.

8. (b) Tranquilizers are a class of chemical compounds used for the treatment of stress and mild or even severe mental disease.

9. (d) Bithinol is added to soaps to impart antiseptic properties. Sodium laurysulphate and sodium dodecyl-benzenesulphonate are anionic detergents.

A gum rosin added to soap to make it leather well.

10. (b) Equanil is a tranquilizer.

11. (b) While preparing soaps, a gum called rosin is added to them. It forms sodium rosinate which leathers well.

12. (c) Gylcerol is added to shaving soap to prevent rapid drying.

13. (b) Liquid dishwashing detergents are non-ionic. Mechanism of cleansing action of this type of detergent is same as that of soaps. These also remove grease and oil by micelle formation.

Liquid dishwashing detergent

14. (c) Polyethyleneglycols are used in the preparation of non-ionic detergents. Non-ionic detergents do not contain any ion in their constitution.

$$CH_3(CH_2)_{16}COOH + HO(CH_2CH_2O)_n CH_2CH_2OH$$

Stearic acid — Polyethylene glycol

$$\xrightarrow{-H_2O} CH_3(CH_2)_{16}COO(CH_2CH_2O)_n CH_2CH_2OH$$

15. (c) Drugs usually interact with biomolecules such as carbohydrates, lipids, proteins and nucleic acid. These are called drug targets. Vitamins are not a target molecule for drug function in body.

16. (c) Some drugs do not bind to the enzyme's active site but bind to a different site of enzyme which is called allosteric site, which changes the shape of the active site, in such a way that substrate cannot recognize it. If the bond formed between an enzyme and inhibitor is a strong covalent bond and cannot be broken easily the enzyme is blocked permanently. The body then degrades the enzyme-inhibitor complex and synthesises the new enzyme.

17. (d) Sucralose is trichloro derivative of sucrose. It is stable at cooking temperture. It does not provide calories.

18. (b) Artificial sweeteners are non-caloric substitutes for sugar. They are often more sweet than sugar but do not enhance nutritional value of food.

NEET/AIPMT (2013-2017) Questions

19. (b) Dilute solutions of boric acid and hydrogen peroxide are weak antiseptics.

20. (c) Dettol is a mixture of chloroxylenol and terpineol.

21. (c) Aspartame is stable under cold conditions.

22. (c) Bithionol is added to soaps to impart antiseptic properties.

23. (a) Novalgin is most widely used as analgesic. Analgesics are pain releiving

24. (a) Dettol is a mixture of chloroxylenol and terpineol which is a very commonly known antiseptic.