

DAY THIRTY SIX

Chemistry in Everyday Life

Learning & Revision for the Day

♦ Chemicals in Medicines ♦ Chemicals in Food Preservatives ♦ Cleansing Agents

Drugs are chemicals of low molecular masses (~ 100 to 500μ) which interact with macromolecular targets (carbohydrates, proteins and nucleic acids) to produce a biological response. When the biological response is therapeutic and useful, these chemicals are called medicines. Use of such chemicals to cure a disease or to prevent it, is called **chemotherapy**. These medicines are used in diagnosis, prevention and treatment of diseases.

Chemicals in Medicines

Medicinal chemistry deals with the study of drugs. Some important classes of drugs are given below :

- **Antacids** are the chemical substances which neutralise excess acid in the gastric juices,
 - (i) These are used for treatment for acidity.
 - (ii) Antacids raise the pH of stomach to some appropriate level.
 - (iii) Sodium hydrogen carbonate, a mixture of aluminium and magnesium hydroxide etc., are the commonly used antacids.
- **Antihistamines** are chemical substances which diminish the actions of histamine released by most cells in the body
 - (i) These drugs are used for treatment of allergies. Allergies are caused by an excessive response of the body to allergens (the substances causes allergies).
 - (ii) Examples are diphenylhydramine (benadryl), chlorpheniramine, promethazine, brompheniramine (dimetapp) and terfenadine (seldane), etc.
 - (iii) Histamine also stimulate the secretion of gastric juice (in stomach) but antihistamines do not affect this secretion because antiallergic and antacid drugs work on different receptors.
- **Tranquilizer** is a class of chemical compounds used for the treatment of stress, mild and severe mental diseases. These are commonly called psychotherapeutic drugs. These are the essential component of sleeping pills.

Some examples according to the action of drugs are :

- (i) Anti-depressant drugs, e.g. iproniazid, phenelzine etc., are used to reduce depression.

- (ii) Chlorodiazepoxide and meprobamate, are relatively mild tranquilizer, suitable for relieving tension. Equanil is used in controlling depression and hypertension.
- (iii) Barbiturates such as seconal, luminal, veronal are hypnotic (sleep producing) drugs while valium and serotonin, are non-hypnotic drugs.

NOTE **Reserpine**, a tranquilizer is obtained from Indian plant *Rauwolfia serpentina*.

- **Analgesics** are the chemical substances which reduce or abolish pain. These are classified as follows :
 - (i) Non-narcotic (non-addictive) analgesics, e.g. aspirin and paracetamol are analgesics as well as antipyretics (fever reducing).
Aspirin (acetyl salicylic acid) and paracetamol (N-acetyl-*p*-amino phenol) are non-narcotic (non-addictive) analgesics.
Aspirin inhibits the synthesis of chemicals, known as prostaglandins which stimulate inflammation in the tissue and cause pain. Because of its anti blood clotting action, aspirin is also used in the prevention of heart attacks.
 - (ii) Narcotic analgesics, e.g. morphine, heroin (morphine diacetate), codeine, etc.
- **Antimicrobials** are the drugs that either kill or check growth of microorganism.
- **Antibiotics** are the chemicals synthesised from microbes and have either bacteri-cidal (killing) effect or a bacterio static (inhibitory) effect on microbes.
A few examples of the two types of antibiotics are as follows
 - (i) Bactericidal, e.g. penicillin (a narrow spectrum antibiotic), ampicillin and amoxicillin (semisynthetic modification of penicillin), ofloxacin (broad spectrum), aminoglycosides (streptomycin) (broad spectrum), etc.
 - (ii) Bacteriostatic, e.g. erythromycin, tetracycline, chloramphenicol (a broad spectrum antibiotic) etc.
 - (iii) These drugs inhibits the growth of the organisms, also increases immunity and resistance to infection of the body.
 - (iv) Sulphadiazine, sulphadimidine, sulphadoxine etc. are the examples of such drugs.
- **Antiseptics** are the chemical substances which are applied to the living tissues such as wounds, cuts, ulcers and diseased skin surfaces. Examples are furacine, soframycine, dettol (a mixture of chloroxylenol and α -terpinol), 0.2 per cent solution of phenol. Bithionol (also called bithional) is added to soaps, to reduce the odour produced by bacterial decomposition of organic matter on skin.
- **Disinfectants** are the chemical substances which are applied to inanimate objects such as floors, drainage

system. Examples, one per cent solution of phenol, chlorine and SO_2 (in very low concentration), are disinfectants.

- **Antifertility drugs** are the chemical substances which lead to the concept of family planning.
Birth control pills essentially contain a mixture of synthetic estrogen and progesterone derivatives. e.g. norethindrone (synthetic progesterone) and the estrogen derivative in combination with progesterone derivative, (ethinylestradiol) (novestrol) etc.

Chemicals in Food Preservatives

Substances which are added to food either to improve its taste and flavour or to preserve it, are called food additives. Few main categories of food additives are discussed as follows :

- **Artificial sweetening agents** are the chemical compounds, which give sweetening effect to food and enhance its odour and flavour.
Some examples of artificial sweetening agents are saccharin (*ortho*-sulphobenzimide), aspartame (natural sweet), sucralose, alitame etc.
Alitame is high potency sweetener, although it is more stable than aspartame.
Sucralose is trichloro derivative of sucrose. Its appearance and taste are sugar like. It is stable at cooking temperature. Hence, its use is of great value to diabetic persons who need to control intake of calories.
- **Food preservatives** are the chemical substances which are added to food materials to prevent spoilage of food due to microbial growth. Examples are sodium benzoate, salts of sorbic acid and propanoic acid, etc.
- **Elementary idea of Antioxidants** are the chemical substances which are added to many foods to prevent autoxidation and spoilage and allow long-term storage.
 - e.g. BHT (butylated hydroxy toluene)
BHA (butylated hydroxy anisole)
 - (i) These protective agents function by interrupting the chain reaction of the autoxidation process.
 - (ii) SO_2 and Na_2SO_3 are useful antioxidants for wine and beers, sugar-syrups, peeled fruits, vegetables.

Cleansing Agents

These are also known as **surfactants** or **surface active agents**. In fact, those chemicals which concentrate at the surface of the solution or interfaces or surface films, reduce surface tension of the solution and help in removing dirt and dust by emulsifying grease are known as **surfactants**.

Soaps

Soaps are the sodium or potassium salts of higher fatty acids and are prepared by alkaline hydrolysis of fats or oils. Fats or oils are esters of higher fatty acids.

Glyceryl ester of stearic acid (fat) + Caustic soda

\rightarrow Soap + Glycerol

- Soaps are biodegradable cleansing agents, therefore they do not cause pollution.
- Soaps do not work in hard water because hard water as they contains calcium and magnesium ions. These ions form insoluble calcium and magnesium soaps respectively.

Detergents

Detergents are the cleansing agents, which have soap like properties but do not contain soap like molecules, instead they contain molecules of synthetic source.

These are classified into three types, on the basis of ionic charge present at the soluble end of their chain.

- **Anionic detergents** are the sodium salts of sulfonated long chain alcohols or hydrocarbons. Anionic part of these detergents is involved in the cleansing action.
These are formed by neutralising alkyl benzene sulphonic acids with alkali. e.g Sodium dodecyl benzene sulphonate. Anionic detergents are also used in toothpastes.
- **Cationic detergents** are quaternary ammonium salts of amines with acetates, chlorides or bromides as anions. e.g. Cetyl trimethyl ammonium bromide. These are used in hair conditioners .

- **Non-ionic detergents** do not contain any ion in their constitution. e.g. ester of stearic acid and polyethylene glycol.

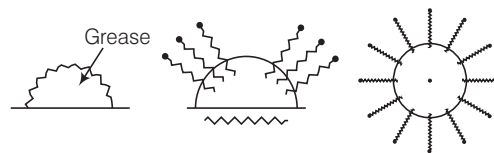
They are used in liquid dishwashing detergents.

- Detergents can be used both in soft and hard water as they give foam even in hard water.
- In detergents, hydrocarbon chain is highly branched, so bacteria cannot degrade this easily. In other words we can say, these are non-biodegradable and cause water pollution.

Cleansing Action

Cleansing action of soap and detergents is described below:

- On applying soap to a dirty wet cloth, the hydrocarbon part (non-polar part) of soap dissolves in grease or dust while the polar carboxylate part is directed towards water.
- Thus, an emulsion is formed between grease particles and water molecules, which appears in the form of foam.
- On washing the cloth with excessive water, these dirt or dust or grease particles are washed away from the surface of cloth along with soap and the cloth becomes clean.



Cleansing action of soap Micelle formation

DAY PRACTICE SESSION 1

FOUNDATION QUESTIONS EXERCISE

1 What kind of substance are antacids?

- (a) Strong acids (b) Weak acids
(c) Strong bases (d) Weak bases

2 Which of the following is not prescribed as antacid?

- (a) Sodium hydrogen carbonate
(b) Sodium chloride
(c) Aluminium hydroxide (d) Magnesium hydroxide

3 Antihistamines can be used for the treatment of

- (a) knee pain (b) viral infections
(c) cough (d) All of these

4 Which one of the following is employed as antihistamine?

→ CBSE-AIPMT 2011

- (a) Diphenyl hydramine (b) Norethindrone
(c) Omeprazole (d) Chloramphenicol

5 Which kind of drugs can be used to reduce anxiety and bring calmness in a person

- (a) analgesic (b) tranquilizer
(c) antihistamine (d) antipyretic

6 Barbituric acid and its derivatives are well known

- (a) analgesics (b) antipyretics
(c) tranquilizers (d) antiseptics

7 Which one of the following is employed as a tranquilizer drug?

- (a) Promethazine (b) Valium
(c) Naproxen (d) Mifepristone

8 The chemical extracted from the plant *Rauwolfia serpentina* is

- (a) aspirin (b) quinine (c) bithional (d) reserpine

9 A drug that is antipyretic as well as analgesic is

- (a) chloroquine (b) penicillin
(c) paracetamol (d) chlorpromazine hydrochloride

10 Acetylation of which compound produces aspirin, a well known analgesic?

- (a) *o*-hydroxy benzoic acid (b) *p*-hydroxy benzoic acid
(c) *m*-hydroxy benzoic acid (d) *o*-dihydroxy benzene

11 Which among the following is/are analgesic?

- | | |
|----------------|----------------|
| 1. Ibuprofen | 2. Naproxen |
| 3. Aspirin | 4. Valium |
| (a) 1 and 2 | (b) 2 and 3 |
| (c) 1, 2 and 3 | (d) 1, 3 and 4 |

12 Which of the following can possibly be used as analgesic without causing addiction and modification?

- (a) Morphine
(b) N-acetyl-*para*-aminophenol
(c) Diazepam
(d) Tetrahydrocatenol

13 Chloramphenicol is

- (a) narrow spectrum antibiotic
(b) broad spectrum analgesic
(c) broad spectrum antibiotic
(d) broad spectrum antibacterial

14 Sulpha drugs are alternatives to

- (a) antihistamines (b) antiseptics
(c) antibiotics (d) analgesics

15 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

16 Chloroxylenol is one of the important components of

- (a) analgesic (b) antibiotic
(c) soap (d) dettol

17 Bithional is generally added to the soaps as an additive to function as a/an → CBSE-AIPMT 2015

- (a) softener (b) dryer
(c) buffering agent (d) antiseptic

18 Tincture of iodine is

- (a) aqueous solution of I_2 (b) solution of I_2 in aqueous KI
(c) alcoholic solution of I_2 (d) aqueous solution of KI

19 Phenol can be utilised as

- I. an antiseptic II. an antibiotic
III. a disinfectant
Chose the correct option.
(a) I and II (b) II and III (c) I and III (d) I, II and III

20 Antiseptics and disinfectants either kill or prevent growth of microorganisms. Identify which of the following statements is not true? → NEET 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

21 An example of synthetic progesterone is

- (a) prontosil (b) norethindrone
(c) salvarsan (d) ofloxacin

22 Artificial sweetener which is stable under cold conditions only is → CBSE-AIPMT 2014

- (a) saccharin (b) sucralose (c) aspartame (d) alitame

23 Which of the following has highest sweetening value?

- (a) Saccharine (b) Aspartame
(c) Sucrose (d) Alitame

24 Which of the following is/are modified form(s) of sucrose?

- (a) Sucrose (b) Sucralose
(c) Aspartame (d) All of these

25 Sweetening agent is helpful for

- (a) obese (b) diabetic
(c) person on low calorie diet
(d) All of them

26 Compound used as a food preservative is

- (a) sodium acetate (b) sodium is α -propanoate
(c) sodium benzoate (d) sodium oxalate

27 The preservative which is ultimately excreted in urine as hippuric acid is

- (a) sodium benzoate (b) sodium metabisulphite
(c) sodium propionate (d) sodium sorbate

28 Butylated hydroxyanisole (BHA), butylated hydroxy toluene (BHT) are important

- (a) antioxidants (b) antifungal
(c) antibacterial (d) dyes

29 Which of the following does not behave as a surfactant?

- (a) Soaps (b) Detergents
(c) Phospholipids (d) Triglycerides

30 Product(s) of saponification is/are

- (a) soap (b) soap and glycerol
(c) detergent and ester (d) soap and ester

31 Function of glycerol present in soap is

- (a) as a filler (b) to increase lathering
(c) to prevent quick drying (d) to make soap granules

32 The detergent which is used as germicide is

- (a) sodium lauryl sulphate
(b) cetyltrimethyl ammonium chloride
(c) lauryl alcohol ethoxylate
(d) sodium 2-dodecyl benzene sulphonate

33 Structurally biodegradable detergents should contain

- (a) normal alkyl chain (b) branched alkyl
(c) phenyl side chain (d) cyclohexyl side chain

34 Which process is involved during cleansing action of soap?

- (a) Saponification (b) Emulsification
(c) Precipitation (d) Solubilisation

35 Which one of the following forms micelles in aqueous solution above certain concentration?

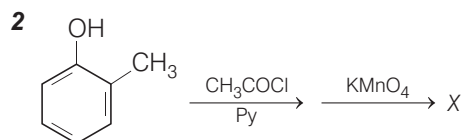
- (a) Urea
(b) Dodecyltrimethylammoniumchloride
(c) Pyridinium chloride
(d) Glucose

DAY PRACTICE SESSION 2

PROGRESSIVE QUESTIONS EXERCISE

- 1** The pH value of gastric juice in human stomach is about 1.8 and in the small intestine, it is about 7.8. The pK_a value of aspirin is 3.5. Aspirin will be

(a) completely ionised in the small intestine and in the stomach
 (b) unionised in the small intestine and in the stomach
 (c) ionised in the small intestine and almost unionised in the stomach
 (d) ionised in the stomach and almost unionised in the small intestine



The final product 'X' is a medicine. Which of the following is incorrect regarding 'X'?

(a) It is analgesic with antipyretic properties
 (b) It helps to prevent heart attack
 (c) It suppresses the gastric anomalies
 (d) It has antiblood clotting action

- 3** Antiseptics are different from disinfectants as

(a) antiseptics merely inhibit the growth and disinfectants kill the microorganisms
 (b) antiseptics are used against microorganisms while disinfectants are used against insects
 (c) antiseptics are used only over skin while disinfectants can be taken orally also
 (d) antiseptics are used over living tissue, while disinfectants cannot be used over living tissues

- 4** Which is the correct statement about birth control pills?

(a) Contains estrogen only
 (b) Contains progesterone only
 (c) Contains a mixture of estrogen and progesterone derivatives
 (d) Progesterone enhances ovulation

- 5** To maintain the palatability and wholesomeness of food, some of the preservatives are used. The cucumber is coated from wax to preserve that. The wax acts as

(a) antifungal
 (b) antibacterial
 (c) antioxidants
 (d) antimicrobial

- 6** Aspartame is one of the good artificial sweeteners whose use is limited to cold foods and soft drinks because

(a) aspartame has very low boiling point
 (b) aspartame gets dissociated at cooking temperature
 (c) aspartame is sweeteners at low temperatures only
 (d) aspartame is not soluble at higher temperatures

- 7** Select the detergent that is used to prepare cosmetics.

(a) DDBS
 (b) Polyethylene glycol
 (c) Cetyltrimethylammonium chloride
 (d) LAS

- 8** How do sulpha drugs act as antibiotics?

(a) By checking the growth of bacteria
 (b) By destroying the cytoplasm of bacteria
 (c) By mutating the bacteria into a harmless form/species
 (d) By promoting the growth of bacteriophage viruses that destroy bacterial cell

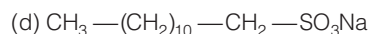
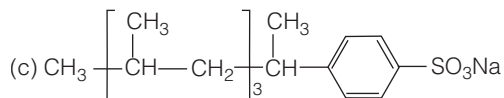
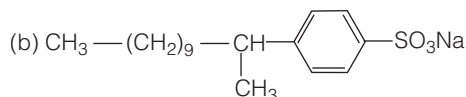
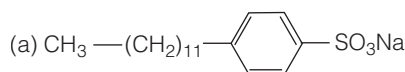
- 9** The amount of potassium hydroxide as number of milligram required to neutralise 1g of the oil or fat is called

(a) alkali value
 (b) rancidification value
 (c) saponification value
 (d) acid value

- 10** Which is not the correct matching of medicine with the disease or activity?

(a) Morphine- pain reliever
 (b) Equanil - hypertension
 (c) Chloramphenicol- typhoid
 (d) Bithional- disinfectant

- 11** Which of the following is an example of non-biodegradable detergent?



12 Which of the following has similarity in structure with a well known orange dye used for dyeing cotton clothes?

- (a) Codeine (b) Prontosil
(c) Penicillin (d) Terpeneol

13 Seldane, an antihistamine, is ineffective in case of hyperacidity even though histamines are responsible for secretion of acid in our stomach, because

- (a) seldane becomes ineffective in presence of food
(b) seldane requires acidic medium to act
(c) the receptor for selane is different from that for an antacid
(d) seldane is digested as soon as it enters the stomach

14 Which of the following tranquilisers does not necessarily induce sleep?

- (a) Phenelzine
(b) Veronal
(c) Valium
(d) Serotonin

15 Hydroxide of magnesium or calcium can not be used to make soap because the soap formed

- (a) is harmful for skin
(b) is not soluble
(c) has undesired odour
(d) reacts with water and make it alkaline

ANSWERS

SESSION 1

1 (d)	2 (b)	3 (c)	4 (a)	5 (b)	6 (c)	7 (b)	8 (d)	9 (c)	10 (a)
11 (c)	12 (b)	13 (c)	14 (c)	15 (a)	16 (d)	17 (d)	18 (c)	19 (c)	20 (b)
21 (b)	22 (c)	23 (d)	24 (b)	25 (d)	26 (c)	27 (a)	28 (a)	29 (d)	30 (b)
31 (c)	32 (b)	33 (a)	34 (b)	35 (b)					

SESSION 2

1 (c)	2 (c)	3 (d)	4 (c)	5 (c)	6 (b)	7 (c)	8 (a)	9 (c)	10 (d)
11 (c)	12 (b)	13 (c)	14 (a)	15 (b)					

Hints and Explanations

SESSION 1

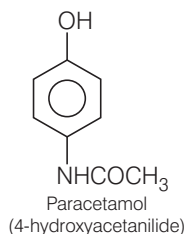
- Antacids are weak bases, which react with hydrochloric acid of stomach to neutralise it and provide relief from acidity.
- Sodium chloride is a neutral solution and hence it is not helpful to counter, acidity. The other three compounds are slightly basic and hence suitable for the purpose.
- Antihistamines or anti-allergic are used to treat medical conditions developed due to allergy like, cough, sneezing, motion sickness etc.
- Diphenylhydramine also known as its patented name benadryl is used as an antihistamine in cough syrup.
- Tranquilizers are the drugs that reduce anxiety and induce calmness and feeling of well being.
- Barbituric acid and its derivatives are tranquilizers and precisely to say hypnotic tranquilizers.
- Tranquilizer is the strain reliever also used for mind and is essential component of sleeping pills.

Thus they are sometimes called **psychotherapeutic drugs**. Equanil, valium and serotonin and barbiturates (hypnotic) are some commonly used tranquilizers.

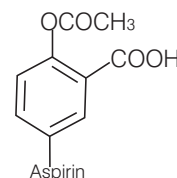
8 Reserpine is one of the natural tranquilizers which is produced from the plant *Rauwolfia serpentina*.

9 Analgesic drugs are used in relieving pain, while antipyretic drugs are used to control fever. Paracetamol is widely used as an antipyretic as well as analgesic.

It means it is used as a pain reliever as well as for reducing fever. Its chemical name is *p*-acetamido phenol.



10 Aspirin (acetyl salicylic acid) is the acetylation product of *o*-hydroxy benzoic acid



11 Analgesics are used for relieving pain. Ibuprofen, naproxen and aspirin all are examples of non-narcotic analgesics. Valium is used for relief in tension and mental stress, so it is a tranquilizer, not analgesic.

12 *N*-acetyl-*para*-aminophenol is non-narcotics analgesic, i.e. it is not habit forming drug. It may be used by patient without causing addiction and modification.

13 Broad spectrum antibiotics are the antibiotics which are effective against several types of harmful microorganisms. Tetracycline, chloromycetin and chloramphenicol are the common

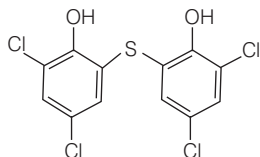
examples of broad spectrum antibiotics. Chloramphenicol is rapidly absorbed from the gastro-intestinal tract and hence, can be given orally. These can be used for curing typhoid, acute fever, dysentery, whooping cough, etc.

14 Sulpha drugs are alternatives to antibiotics. Unlike, antibiotics sulphadruugs are usually synthetic. (usually obtained from natural source)

15 A narrow spectrum antibiotic is active against either gram positive or gram negative bacteria, while a broad spectrum antibiotic is active against both.

16 Dettol is mainly a mixture of chloroxylenol and terpenol, which are responsible for its antibiotic activities.

17 Bithional is added to soap to impart antiseptic properties. It reduces odours produced by bacterial decomposition of organic matter on the skin.



IUPAC name : 2,2', sulfanedi bis (4,6-dichloro phenol).

18 Tincture of iodine refers to 2-5% of solution of iodine in a mixture of alcohol and water. It acts as an antiseptic agent.

19 0.2% solution of phenol acts as an antiseptic, while 1% solution of phenol acts as a disinfectant.

20 Dilute solutions of boric acid and hydrogen peroxide are weak antiseptics..

21 Norethindrone is an example of synthetic progesterone derivative, which is most widely used as antifertility drugs.

22 Aspartame an artificial sweetener, is actually a protein. At high temperature or during cooking it denatures and loses its sweetening properties, Hence, it is suitable for use in cold drinks, processed foods etc. which do not requires further cooking.

23 Alitame is about 2000 time more sweet than cane sugar, i.e sucrose.

24 Sucralose is obtained by chlorination of sucrose. It is about 600 times as sweet as sucrose .

25 Artificial sweetening agents do not provide any calories and its digestion or excretion does not require insulin. Hence, these sweeteners are suitable for all the mentioned people.

26 Sodium benzoate is used as a food preservative.

27 Sodium benzoate is metabolised by conversion to hippuric acid, $C_6H_5CONHCH_2COOH$, which is ultimately excreted in the urine.

28 BHA and BHT protect foods from auto oxidation and rancidification and hence, are called anti-oxidants.

29 Triglycerides do not have polar heads and non-polar tails and hence, do not behave as surfactants.

30 When ester of higher fatty acid reacts with and alkali, soap and glycerol are formed, this reaction is called saponification.

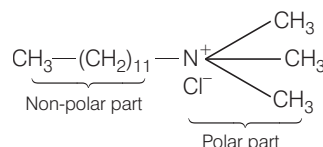
31 Glycerol is hygroscopic and hence it absorb water and prevent quick drying of soap. This in turn helps in convenient application of soap.

32 Cetyltrimethyl ammonium chloride is a cationic detergent. It is used in shampoo and germicidal cleaning agent.

33 A normal open chain can be degrade by microorganism more easily than closed or branched chain.

34 During cleansing, soap molecules aggregate around an oily droplet. This process is called emulsification and aggregate are called micelle.

35 Dodecyl trimethylammonium chloride is an example of surfactant (cationic surfactant), so it shows following phenomenon.



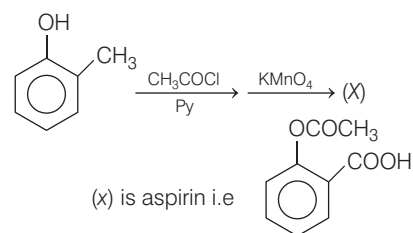
It forms micelles in aqueous solution above certain concentration called CMC (critical micelle concentration).

SESSION 2

1 (c) At pH of 3.5 or 6.5, intestinal absorption of aspirin is more than gastric absorption of compound.

Aspirin is not absorbed by the stomach at given pK_a . Aspirin can be absorbed to an appreciable extent in its ionised form by the small intestine but not by the stomach.

2 (c) According to the given relation.



It will not suppresses the gastric anomalies.

Hence (c) is the correct answer.

3 (d) Antiseptics are chemicals which are applied to the living tissues such as wounds, cuts and ulcers etc. While disinfectants are applied to inanimate objects such as floors, drainage etc. Hence, (d) is the correct option.

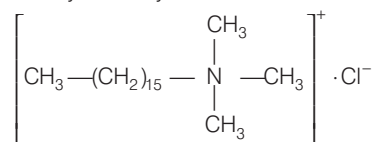
4 (c) Birth control pills are mixture of estrogen and progesterone derivatives. Thus, (c) is the correct option.

5 (c) Fresh vegetables like cucumber are coated with edible wax to preserve them so that they prevents moisture loss from cucumber during transportation and in the days leading upto purchase. They also provide shining and act as an antioxidants.

6 (b) Aspartame is methyl ester of dipeptide, formed by the aspartic acid and phenylalanine. It is unstable at cooking temperature and will not provide any calories.

∴ (b) is the correct answer.

7 (c) Detergent used to prepare cosmetics is cetyltri methylammonium chloride.



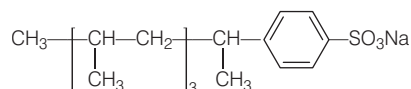
It can be used as conditioning agent and in shampoos etc.

8 (a) Sulpha drugs are antibiotics and bacteriostatic in nature i.e. they check the growth of harmful bacteria's. Hence, (a) is the correct option.

9 (c) Saponification value represents the number of milligrams of potassium hydroxide required to saponify 1g of fat under the specified conditions. Hence, (c) is the correct answer.

10 (d) Bithional is used in medicated soaps to impart antiseptic properties in soap. Thus option (d) is incorrectly matched. All other are correctly matched.

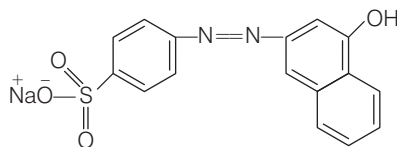
11 (c) Highly branched detergents are normally non-biodegradable e.g.



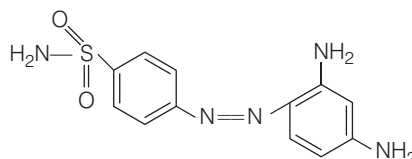
These causes environmental pollution. Hence, (c) is the correct option.

12 (b) Prontosil is an antibacterial drug. Its structure is similar to that of orange-dye (azo-dye)

Structure of orange -dye-(orange-1)

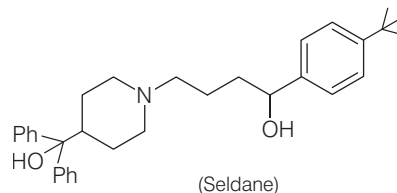


Structure of prontosil



∴ Both contain benzene ring and azo bonds. Thus, their structures are said to be similar.

13 (c) Seldane is an antihistamine. Its structure is



The receptors for seldane are different from that for an antacid means the drug works on different receptors.

∴ Option (c) is the correct answer.

14 (a) The class of chemicals used for treatment of stress and mild or severe mental diseases are called tranquilizers. On the basis of their sleeping action, these are mainly of two types.

- (i) Which induces sleep, like vesonal, valium, serotonin etc. These are derivatives of barbituric-acid.
- (ii) Which does not induce sleep like Iproniazid and phenelzine etc.

Hence, (a) is the correct option.

15 (b) Hydroxides of magnesium and calcium cannot be used to make soaps because charged calcium and magnesium ions present in water will react with soap and form an insoluble substance.

Hence, option (b) is the correct answer.