Chemistry in everyday life

Drugs and Chemotherapy

In general the drug may be defined as the substances used in the prevention, diagnosis, treatment or cure of disease in man or animals.

"The use of chemicals to destroy infectious micro organisms without causing any injury to the host is called as chemotherapy" .

1. Classification of drugs

(a) On the basis of pharmacological effect

It is useful for doctors because it provides them the whole range of drugs available for the treatment of a particular type of problem. For example, analgesics have pain killing effect, antiseptics kill or arrest the growth of microorganisms.

(b) On the basis of drug action

It is based on the action of a drug on a particular biochemical process. For example, all antihistamines inhibit the action of the compound, histamine which causes inflammation in the body.

(c) On the basis of chemical structure

Drugs classified in this way share common structural features and often have similar pharmacological activity.

(d) 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 the same mechanism of action on targets.

2. Drug target interaction

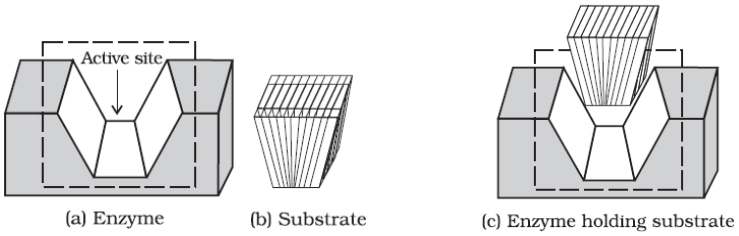
Macromolecules of biological origin perform various functions in the body for example proteins which perform the role of biological catalysts in the body are called **enzymes**, and those which are crucial to communication system in the body are called **receptors**.

2.1 Enzymes as drug targets

(a) Catalystic action of enzymes

In catalytic activity, enzymes perform two major functions as follows

(i) To hold the substrate for chemical reaction :



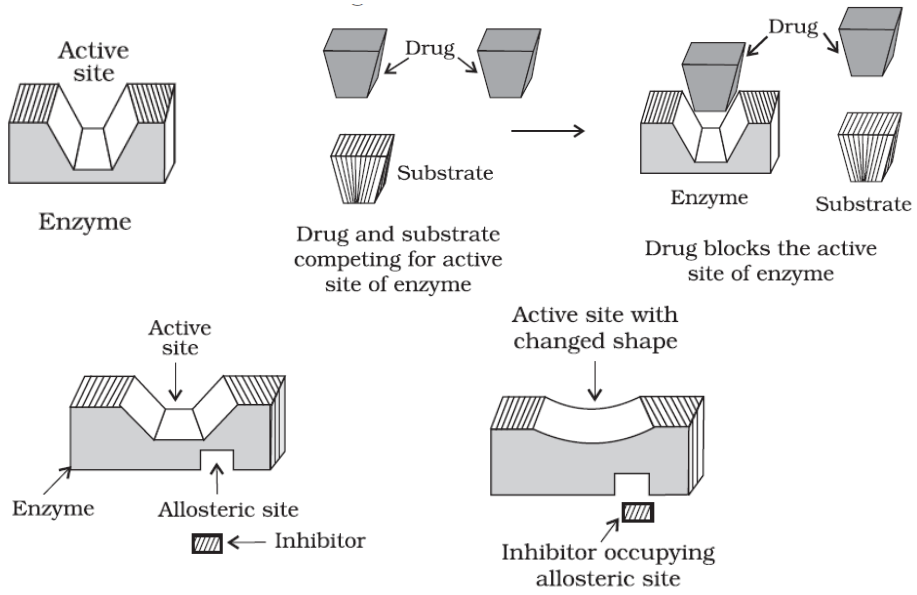
(ii) The second function of the enzyme is to provide functional group which will attacks the substrate to carry out chemical reaction.

(b) Drug enzyme interaction

Drugs inhibit any of the above mentioned activities of enzymes. These can block the binding site of the enzyme and prevent the binding of substrate, or can inhibit the catalytic activity of the enzyme. Such drugs are called **enzyme inhibitors.**

(i) Drugs compete with the natural substrate for their attachment on the active sites of enzymes. Such drugs are called **competitive inhibitors.**

(ii) Some drugs do not bind to the enzyme's active site. These bind to a different site of enzyme which is called **allosteric site**.



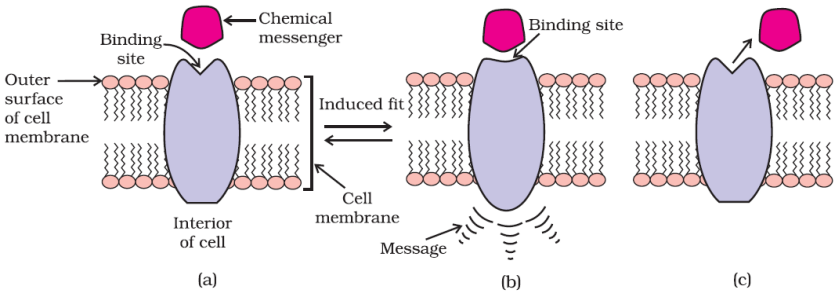
2.2 Receptors as drug targets

Receptors are proteins that are crucial to body's communication process.

There are two types of **chemical messengers** :

(i) Hormones (ii) Neurotransmitters.

In the body, message between two neurons and that between neurons to muscles is communicated through certain chemicals. These chemicals, known as **chemical messengers** are received at the binding sites of receptor proteins. To accommodate a messenger, shape of the receptor site changes. This brings about the transfer of message into the cell. Thus, chemical messenger gives message to the cell without entering the cell.



(a) Receptor receiving chemical messenger
(b) Shape of the receptor changed after attachment of messenger
(c) Receptor regains structure after removal of chemical messenger.

Drugs that bind to the receptor site and inhibit its natural function are called **antagonists**. These are useful when blocking of message is required. There are other types of drugs that mimic the natural messenger by switching on the receptor, these are called **agonists**. These are useful when there is lack of natural chemical messenger.

3. Therapeutic action of different class of drugs

3.1 Antacids

The chemicals which are used to reduce the acidity of the stomach are called antacids.

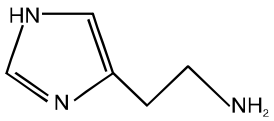
*Antacids are basic in nature. Their pH value is in the range of 7.0 to 8.0. Example sodium hydrogencarbonate or a mixture of **aluminium and magnesium hydroxide.**

Excess of acidity leads to formation of excess of histamine. Therefore modern synthetic drugs are antihistamines for the treatment of gastic ulcers by blocking the acid release action of histamine.

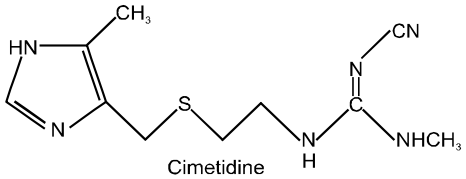
Common drugs are :

(a) Cimetidine (Tagamet), (b) Ranitidine (Zantac),

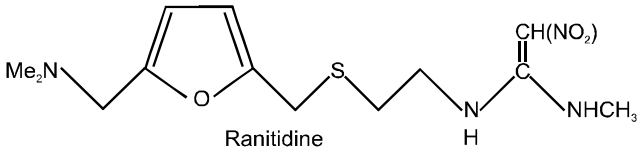
(c) Omeprazole, (d) Lansoprazole,



Histamine



Cimetidine



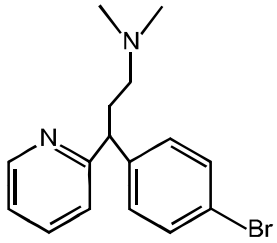
Ranitidine

3.2 Antihistamines or Antiallergic drugs

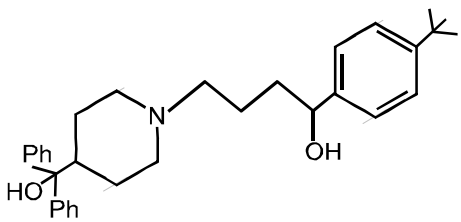
Histamine is a potent vasodilator. It has various functions. It contracts the smooth muscles in the bronchi and gut and relaxes other muscles, such as those in the walls of fine blood vessels. Histamine is also responsible for the nasal congestion associated with common cold and allergic response to pollen.

*Antihistamines are the drugs which diminish or abolish the effects of histamine.

Synthetic drugs, brompheniramine (Dimetapp) and terfenadine (Seldane) act as antihistamines.



Brompheniramine
(Dimetapp. Dimetane)



Terfenadine (Seldane)

Allergy : Allergy may be defined as the hypersensitive reponse of the body of certain persons to the external stimulus (such as some drugs, foods, dust, pollen grains, catfur fabrics etc.)

*The substances which cause allergy are called allergens. *Most commonly used anti-histamine under the trade name **avil (Pheniramine maleate) and zeet.**

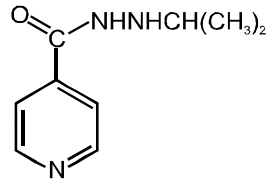
3.3 Neurologically active drugs

(a) Tranquilizers (Antidepressant drugs)

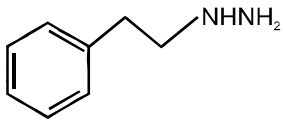
*The chemicals which are used to reduce mental tension, relieve anxiety and mental stress are called Tranquilizer. They act on central nervous system and are hypnotics.

*Tranquilizers are effective in such mental disorder when ordinary hypnotics or sedatives fail. These are called as psychotherapeutic drugs.

Noradrenaline is a mood change neurotransmitter. Iproniazid and phenelzine are anti depressent drugs. These drugs inhibits the enzyme which catalyse the degradation of noradrenaline.



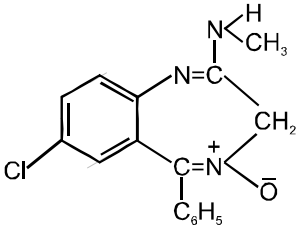
Iproniazid



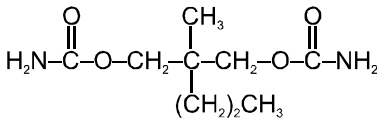
Phenelzine (Nardil)

Note : * Reserpine, an alkanoid, is a powerful tranquillizer. It is obtained from a plant Rauwolfia serpentina (common name - Sarpagandha) which grows in india.

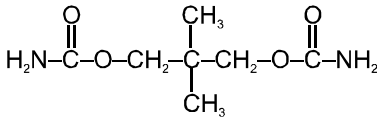
Tranquillizer namely chlordiazepoxide and meprobamate are relatively mild suitable for relieving tension. Equanil is used in controlling depression and hypertension.



Chlordiazepoxide

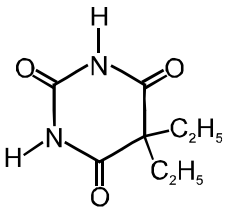


Meprobamate

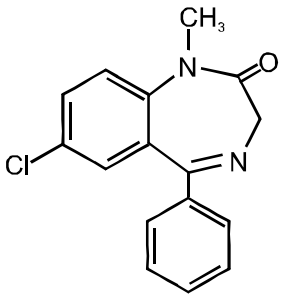


Equanil

Barbituric acid and their derivatives (Barbiturates) as **veronal, amytal, nembutal, seconal** and **luminal** are hypnotic and sleep producing agents. Some other substances used as tranquillizers are valium and serotonin.



Veronal



Valium

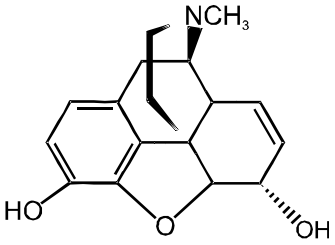
(b) Analgesics

The chemicals which are used for relieving pain are called **Analgesics**.

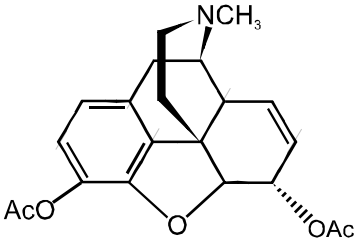
(i) Non-narcotic analgesics (Non addictive) : Aspirin (acetyl salicylic acid), Paracetamol (4-acidamido phenol), Ibuprofen belong to this class. These drugs also act as antipyretic (reducing fever), and preventing platelet coagulation.

(ii) Narcotic Analgesics

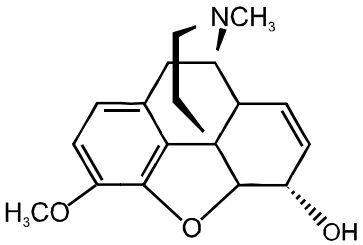
Morphine, Heroin, Codeine and its homolgues in medicinal doses, relieve pain and produce sleep. In higher doses these produce STUPOR, COMA, CONVULSIONS and ultimately death. The narcotics are mainly used for the relief of postoperative pain, cardiac pain and pain of terminal cancer, and in child birth.



Morphine



Heroin



Codeine

3.4 Antimicrobials

*The chemicals which stop the growth or kill the micro organism such as bacteria, virus, fungi, molds etc are called antimicrobials.

* Antibiotics, antiseptics and disinfectants are antimicrobial drugs.

(a) Antibiotics

*The chemicals produced by micro organisms like bacteria, fungi and molds that inhibit the growth or destory other micro organism causing infectious diseases in men or animal's body are called antibiotics. The range of bacteria or other microorganisms that are affected by a certain antibiotic is expressed as its spectrum of action.

Antibiotics which kill or inhibit a wide range of Gram-positive and Gram-negative bacteria are said to be **broad spectrum antibiotics**. Those effective mainly against Gram-positive or Gram-negative bacteria are **narrow spectrum antibiotics**.

Bactericidal	**Bacteriostatic**
Penicillin	Erythromycin
Aminoglycosides	Tetracycline
ofloxacin	Chloramphenicol

(I) Penicillin : *Six types of penicillines have been isolated so far. Among them penicillin-G is most widely used and is narrow spectrum.

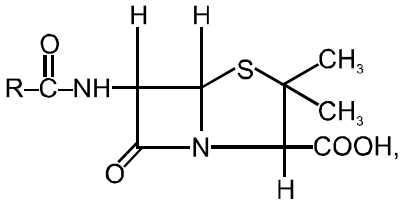
*Ampicillin and amoxicilline are synthetic modification of penicilline and these have broad spectrum effect.

Penicillin is used for the treatment of pneumonia bronchitis bounds etc.

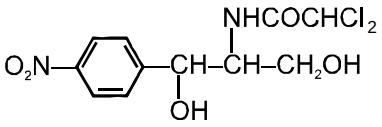
(II) Streptomycin : It is an effective broad spectrum antibiotic. It is used for the treatment of tuberculosis, meningitis and pneumonia

(III) Tetracyclin : Teramycin and oriomycin are important examples of this class of antibiotics. Teramycin is used for the treatment of typhoid and oriomycin is used for the the treatment of eyes.

(IV) Chloramphenicol : It is marketed as chloromycetin and is used for the treatement of typhoid, dysentery pneumonia, meningitis etc.



General Sturcture of Pencillin

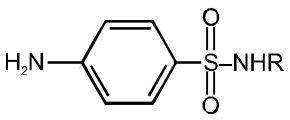


Chloramphenicol

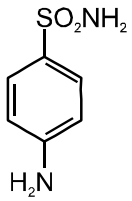
(V) Sulpha Drugs

A group of drugs (Sulphonamides) which are derivatives of sulphanilamide are known as **sulpha drugs**.

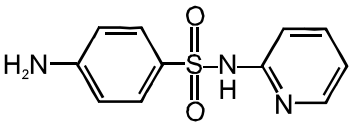
eg. Sulphadiazine, Sulphapyridine.



Structural features of sulphonamides

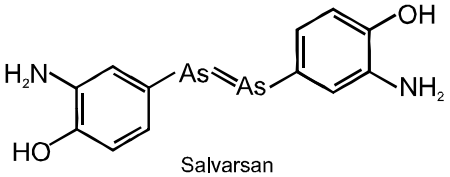


Sulphanilamide

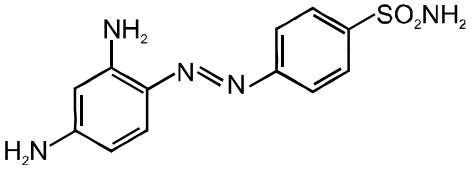


Sulphapyridine

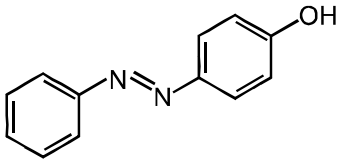
* Structure of some other antibacterial drugs have similar structural features.



Salvarsan



Prontosil



Azodye

(b) Antiseptic and Disinfectants

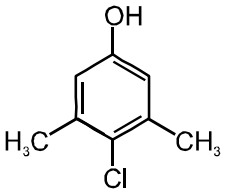
Antiseptics and disinfectants are also the chemicals which either kill or prevent the growth of microorganisms.

***Antiseptics** are applied to the living tissues such as wounds, cuts ulcers and diseased skin surface. Examples are furacin, soframycin etc.

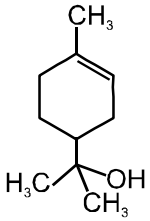
* These are not ingested like antibiotics.

*Commonly used antiseptic is **dettol**, it is a mixture of chloroxylenol and terpineol.

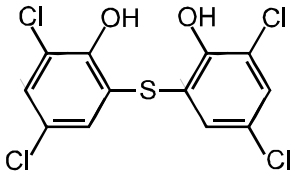
***Bithional** is added to soaps to impart antiseptic properties.



Chloroxylenol



Terpineol



Bithionol

Iodine is a powerful antiseptic. Its 2-3 percent solution in alcohol water mixture is known as tincture of iodine

*Iodoform is also used as antiseptic for wounds, boric acid in dilute aqueous solution is weak antiseptic for eyes.

Disinfactants are the substances which applied to inanimate objects such as floor, drainage system, instruments etc.

*One substance can act as an antiseptic and also act as disinfactant for example :

(i) **0.2 percent solution of phenol** is an antiseptic while its 1% solution is disinfectant.

(ii) **Chlorine in 0.2 to 0.4 ppm** in aqueous solution is used to disinfect drinking water.

(iii) **Hexachlorophen :** It is mainly used in soaps creams and emulsions.

(iv) **Thymol :** It is a natural derivative of phenol and is a powerfull disinfectant.

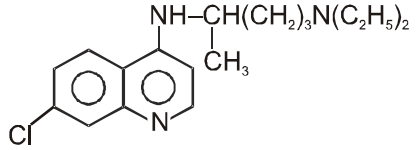
(v) **Amyl meta cresol (5-methyl-2-pentyl phenol)** it is used as antiseptic in mouth wash or gargles.

(vi) **Gention violet and methylene blue** are organic dyes but used as effective antiseptic.

(c) Antimalarials

In earlier days malaria was treated with the bark of **cinchona tree**.

* The chloroquine and their phosphates are sold in the market as antimalarial drugs under the trade name - resochin, larigo, ciplaquine, nivaquine etc.



Chloroquine

(d) Antifungal drugs : These are drugs used for superfical and deep (systemic) fungal infections. Two important antibiotics used as antifungal drugs, introduced way back in 1960, are **amphotericin-B** and **griseofulvin**.

(e) Antiamoebic drugs : These are drugs useful in infection, caused by the protozoa entamoeba histolytica. Metronidazole, tinidazole and tetracyclines are important antiamoebic drugs, used these days.

(f) Antiviral drugs : Viruses are the ultimate expression of parasitism; they not only take nutrition from the host cell but also direct its metabolic machinery to synthesize new virus particles. Acyclovir, ribavirin, zidovudine, interferons are some of the important antiviral drugs, used these days.

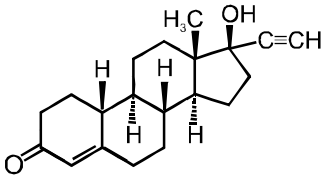
3.5 Antifertility drugs

"Chemcial substances which are used to check pregnancy in women are called anti-fertility drugs or birth control pills or oral contraceptives".

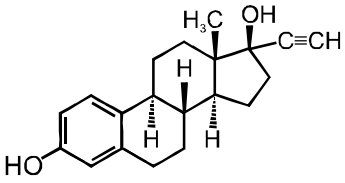
*Birth control pills essentially contain a mixture of synthetic estrogen and progesteron derivatives. Both of these compounds are hormones.

eg. : Norethyndron, Ethynylestradiol (novestrol)

*Mifepristone is a synthetic steriod that blocks the effects of progesterone and is used as a "morning after pill" in many countries.



Norethindrone



Ethynylestradiol (novestrol)

4. Chemicals in food

Chemicals are added to food for their preservation, enhancing their appeal and adding nutritive values in them Main catergories of food additives are as follows

(i) Food colours.
(ii) Flavours and sweeteners.
(iii) Fat emulsifiers and stabilising agents.
(iv) Flour improvers, antistaling agent and bleaches.
(v) Antioxidants
(vi) Preservatives
(vii) Nutritional supplements such as minerals

Vitamins and amino acids, except for chemicals of category-(vii) none of the above have nutritive values.

4.1 Food preservatives

*The chemical which are used to stop undesirable change in food caused by microorganism and save them from spoiling are called preservatives. It reduces (stop the growth) rate of reactions occuring due to bacteria in food.

*The following properties must be present in a preservative :

(i) It should not react with food material.
(ii) It's effect should be for longer period.
(iii) It should not decrease the quality of food.
(iv) It should not have harmfull effect on the body.

Improtant preservatives are as follows

(a) Sodium benzoate : It's 0.06% to 0.1% concentration is used for preservation of fruit juice, jam, jelly, pickles etc.

(b) Parabens : These are alkyl p-hydroxy benzoate and used for preservation of tomato sauce etc.

(c) Sorbates : These are salt of sorbic acid and used for preservation of milk cheese preparation certain meats and fish products. It inhibit the growth of yeast.

(d) Propionates : These are ethyl and phenyl ester of propionic acid and used for the preservation of biscuits and baked product from mold fungi etc.

(e) Sodium or potassium metabisulphite ($Na_2S_2O_5$ or $K_2S_2O_5$) : It is used as a preservative for food products such as jams, squashes, pickles etc.

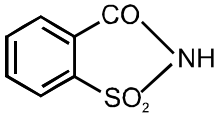
(f) Epoxides : Epoxides are gases and preserves low moisture foods like nuts, dried fruits. Epoxides destroy all type of microorganism including spores and viruses.

(g) p-Hydroxy benzoate ester : The methyl, ethyl propyl and heptyl esters of p-hyroxybenzoic acid are used as preservatives in baked foods, soft drinks, beer and syrups.

(h) Table salt and sugar are also used for food preservatives.

4.2 Artificial sweetening agents

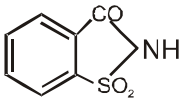
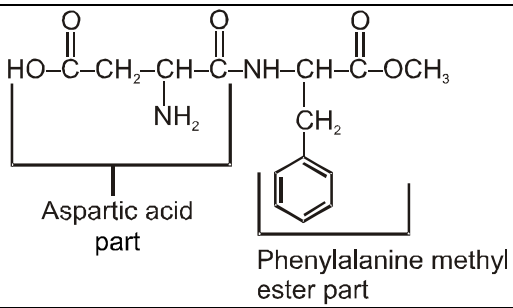
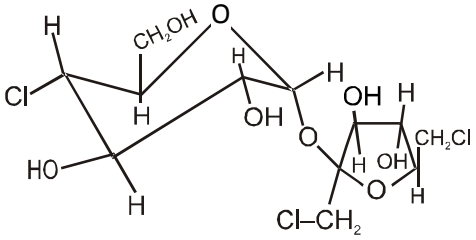
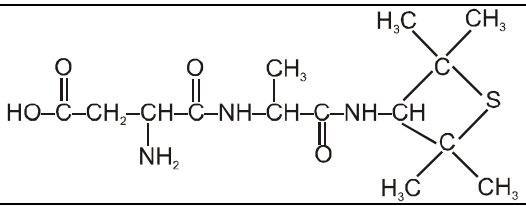
* Saccharine is the first popular artificial sweetening agent used since 1879. It is about 550 times more sweet as cane sugar.



Saccharin

*It's use is of great value to diabetic persons and people who need to control intake calories.

*It is used in pan masala, cheap ice cream, cheap drinks, mouthwash, cheap toffies, toothpaste etc.

Artifical sweeteners	**Structural formula**	**Sweetness value in comparison to cane sugar**	**Remark**
(1) Saccharine (o-sulpha) (insoluble in water)		550	Harmless and excreted from body in urine unchanged. (Sodium salt of saccharine is soluble in water)
(2) Aspartame	 Aspartic acid part Phenylalanine methyl ester part	100	Widely used artificial sweetner. Use is limited to cold foods and coldrinks because it is **unstable** at cooking temperature.
(3) Sucralose		600	Trichloro derivative of sucrose. Stable at cooking temperature and does not provide calories.
(4) Alitame		2000	It is highly potency sweetener, although it is more stable than aspartame, the control of sweetness is difficult while using it.

4.3 Antioxidants

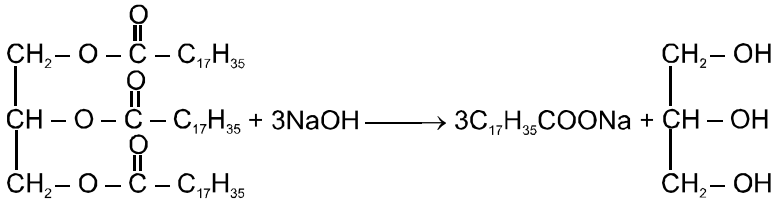
*The chemical substance which reduce the rate of reaction with oxygen in food, thus help in their preservation are called antioxidants.

*They reduce the rate of formation of free radicals responsible for ageing process 2,6-ditertiary butylhydroxy toluene (p-crysol, BHT) and 2-tertiary butyl hydroxy anisole (BHA) are two most familiar antioxidants used.

5. Cleansing agents

5.1 Soaps

Soaps are sodium or potassium salts of long chain fatty acids e.g steric, oleic and palmitic acids. Soap containg sodium salts are formed by heating fat (i.e. glyceryl ester of fatty acid) with aqueous sodium hydroxide solution. This reaction is known as SAPONIFICATION. Generally potassium soaps are soft to the skin.



Glyceryl ester of stearic acid (Fat) | Sodium hydroxide | Sodium stearate | Glycerol (or Glycerine)

Types of soaps :

There are so many types of soaps due to the using different raw materials

(i) Toilet soaps **(ii) Water floating soaps** **(iii) Transparent soaps**
(iv) Medicated soap **(v) Shaving soaps** **(vi) Loundry soaps**
(vii) Soaps chips **(viii) Soap granules**

Que.	Why do soaps not work in hard water ?
Ans.	Hard water contains calcium and magnesium ions. These ions form insoluble calcium and magnesium soaps respectively when sodium or potassium soaps are dissolved in hard water. These insoluble soaps separate as scum in water and are useless as cleansing agent.

5.2 Detergents

The synthetic products, which like soaps remove dust and grease from a surface are called detergents, since they are not soap but work like a soap so they are also called as soapless soap.

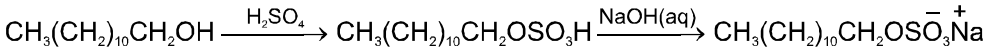
These can be used both in soft and hard water, as they give foam even in hard water

Synthetic detergents are mainly classified into three catagories :

(i) Anionic detergents

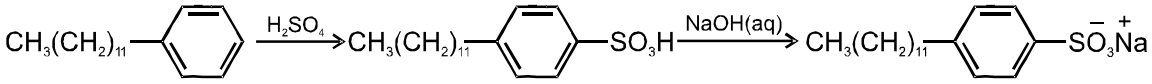
These are sodium salt of sulphonated long chain alcohols or hydrocarbons.

eg. Lauryl alcohol, Lauryl hyrogen sulphate, Sodium lauryl sulphate



Lauryl alcohol | Lauryl hydrogensulphate | Sodium laurylsulphate (Anionic detergent)

eg. : Sodium alkyl sulphate or Sodium alkyl sulphonate



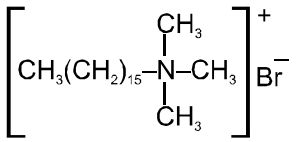
Dodecylbenzene | Dodecylbenzenesulphonic | Sodium dodecylbenzenesulphonate

In anionic detergents, the anionic part of the molecule is involved in the cleansing action. These are smoothly used for household work and are also used in **toothpastes**.

(ii) Cationic detergents

These are quatenary ammonium salts of amines with acetates, chlorides or bromides as anion. Cetyltrimethylammonium bromide is a popular cationic detergent.

Cationic detergents have germicidal properties and are expensive.

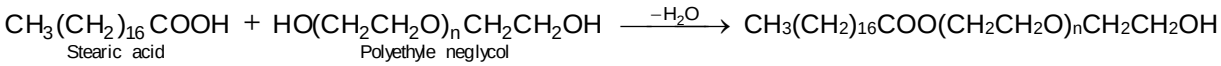


Cetyltrimethyl ammonium bromide

(iii) Non-ionic detergents

These are moslty esters of poly hydroxy alcohols. They are in liquid form, and do not contain any ion in their constiution. One such detergent is formed when stearic acid reacts with polyethyleneglycol.

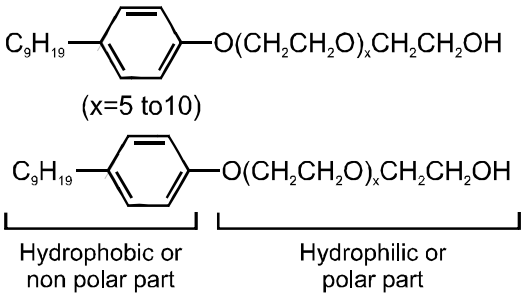
Liquid dishwashing detergents are non-ionic type. Mechanism of cleansing action of this type of detergents is the same as that of soaps. These also remove grease and oil by micelle formation. Main problem that appears in the use of detergents is that if their hydrocarbon chain is highly branched, then bacteria cannot degrade this easily. Slow degradation of detergents leads to their accumulation.



Stearic acid — Polyethyle neglycol

Effluents containing such detergents reach the rivers, ponds, etc. These persist in water even after sewage treatment and cause foaming in rivers, ponds and streams and their water gets polluted. These days the branching of the hydrocarbon chain is controlled and kept to the minimum. Unbranched chains can be biodegraded more easily and hence pollution is prevented.

Note : Liquid dish washing detergents are non ionic type.



(x=5 to10)

Hydrophobic or non polar part — Hydrophilic or polar part

Difference between soap and detergents

(1) Soaps are salts of weak acid and strong base whereas detergents are salts of strong acid and strong base.

(2) Aqueous solution of soap is basic where as aqueous solution of detergents is neutral.

(3) woolen and silk cloths in which soft fibres are present cannot be washed with soap whereas all type of fabrics can be washed with detergents.

(4) Soap cannot work in hard water because soaps are precipitated as insoluble salt by reaction with Ca^{2+} and Mg^{2+} ions.

Exercise-1

PART - I : SUBJECTIVE QUESTIONS

Section (A) : Chemisty in every day life

A-1. Name two semisynthetic modifications of penicilin.

A-2. What is the role of boric acid in talcum powder ?

A-3. Name a phenolic antibacterial used in body deodorants.

A-4. Define the term chemotherapy.

A-5. Name one estrogen which is a constituent of an oral contraceptive.

A-6. What type of drug is ofloxacin ?

A-7. Name the medicine which can act both as an analgesic as well as an antipyretic.

A-8. Name two fixatives used in perfumes.

A-9. What is role of borax in cold creams ?

A-10. Name the fuel used in satellite SLV-3.

A-11. Why is bithional added to the toilet soap ?

A-12. Give one important use of each of the following in pharmacy ?
(i) Equanil (ii) Morphine

A-13. Explain the term, target molecules or drug-targets as used in medicinal chemistry.

A-14. Why should not medicines be taken without consulting doctors?

A-15. Which forces are involved in holding the drugs to the active site of enzymes?

A-16. What is tincture of iodine? What is its use?

A-17. What problem arises in using alitame as artificial sweetener?

A-18. Give names of two substances used as preservatives.

A-19. Give two examples of synthetic detergents.

A-20. Name the sweetening agent used in the preparation of sweet for a diabetic patient.

A-21. Why do soaps not work in hard water?

A-22. If water contains dissolved calcium bicarbonate, out of soaps and synthetic detergents which one will you use for cleaning clothes?

A-23. Label the hydrophilic and hydrophobic parts in the following compounds.
(i) $CH_3(CH_2)_{10}CH_2OSO_3^-\ Na^+$
(ii) $CH_3(CH_2)_{15}N^+(CH_3)_3Br^-$
(iii) $CH_3(CH_2)_{16}COO(CH_2CH_2O)_nCH_2CH_2OH^-$

A-24. Name one medicinal compound each that is used to treat :
(i) hypertension (ii) general body pain

A-25. Antacids and antiallergic drugs interfere with the function of histamines but why do these not interfere with the function of each other?

A-26. Low level of noradrenaline is the cause of depression, what types of drugs are needed to cure this problem? Name two drugs.

A-27. Why are cimetidine and ranitidine are better antacids than sodium bicarbonate or magnesium hydroxide or aluminium hydroxide.

A-28. How do omeprazole and lansoprazole act as antacids ?

A-29. What are the functions performed by histamine in the body ?

A-30. Name the substance which can act as both
(i) Analgesic and antipyretic. (ii) Antiseptic and disinfectant

A-31. What are food preservatives ?

PART - II : ONLY ONE OPTION CORRECT TYPE

Section (A) : Chemisty in every day life

A-1. Morphine is used as an
(A) Antipyretic (B) Antiseptic (C) Analgesic (D) Insecticide

A-2. Which of the following is not an alkaloid ?
(A) Reserpine (B) Morphine (C) Quinine (D) Phenylbutazone

A-3. The antibiotic used for curing tuberculosis is :
(A) Penicillin (B) Streptomycin (C) Tetracycline (D) Chloromycetin

A-4. The drugs used to get relief from pain are called :
(A) Antipyretics (B) Analgesics (C) Antibiotics (D) Antiseptics

A-5. A medicine which promotes secretion of urine is called :
(A) Diuretic (B) Antipyretic (C) Analgesic (D) Sedative

A-6. The antiseptic action of dettol is due to
(A) Chlorobenzene (B) Chloroxylenol (C) Chloroquine (D) Chloramphenicol

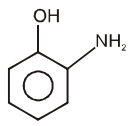
A-7. Octane number is zero for -
(A) Isoheptane (B) n-heptane (C) Isooctane (D) n-octane

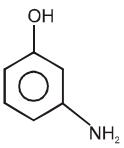
A-8. Which of the following is not an antiseptic drug ?
(A) Iodoform (B) Dettol (C) Gammexane (D) Gentian violet

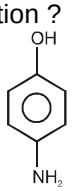
A-9. Which of the following is not an antibiotic ?
(A) Penicillin (B) Sulphaguanidine (C) Chloramphenicol (D) None of these

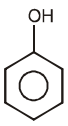
A-10. Which of the following is used as a “morning after pill” ?
(A) Norethindrone (B) ethynylestradiol (C) Mifepristone (D) Bithional

A-11. Which of the following is not true for antibiotics ?
(A) Tetracycline is one of the broad spectrum antibiotics which is effective against a large number of harmful micro-organism.
(B) Streptomycin is highly effective against microorganisms which cause tuberculosis.
(C) Penicillin has a narrow spectrum and certain persons are sensitive to it.
(D) Penicillin may be administered without testing the patients for sensitivity to it.

A-12. Which of the following gives paracetamol on acetylation ?
(A) 

(B) 

(C) 

(D) 

A-13. The most widely used antipyretic is
(A) Salicylic acid (B) Phenacetin (C) Paracetamol (D) Aspirin

A-14. Which statement is incorrect ?
(A) Salol is used as antiseptic
(B) Tincture of iodine is 2-3% solution of iodoform in alcohol-water.
(C) Thiourea and benzenethiol can be separated by water.
(D) Aspartame is used as sweetning agent in cold drinks.

PART - III : COMPREHENSION

Read the following passage carefully and answer the questions.

Comprehension #

Antibiotics are the chemical substances which are produced by micro-organisms like bacteria, fungi and moulds. Antibiotics can inhibit the growth or even destroy other micro-organisms. Now a days, synthetic antibiotics are also available. The first successful antibiotic produced was penicillin. The antibiotics may be either bacteriocidal (kills the organism in the body) or bacteriostatic (inhibits the growth of organism). Ampicillin and amoxycillin are modified antibiotics. Broad spectrum antibiotics are effective against several types of harmful micro-organisms.

1. Chloramphenicol is :
(A) antipyretic (B) broad spectrum antibiotic
(C) azo dye (D) tranquillizer

2. Which of the following is/are not an antibiotic ?
(A) Chloramphenicol (B) Sulphadiazine (C) Penicillin (D) Bithional

3. Which among the following antibiotics is bacteriostatic ?
(A) Penicillin (B) Ofloxacin (C) Aminoglycosiders (D) Erythromycin

4. Which of the following antibiotics is/are the modification of penicillins ?
(A) Ofloxacin (B) Ampicillin (C) Amoxycillin (D) Tetracycline

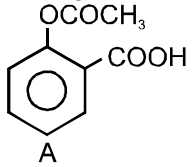
5. Which of the following antibiotics is effective against tuberculosis ?
(A) Chloromycetin (B) Tetracycline (C) Penicillin (D) Streptomycin

Exercise-2

JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

JEE(MAIN) OFFLINE PROBLEMS

1. Compound A given below is - **[AIEEE - 2002, 3/225]**



A

(1) Antiseptic (2) Antibiotic (3) Analgesic (4) Pesticide

2. Which of the following could act as a propellant for rockets ? **[AIEEE - 2003, 3/225]**
(1) Liquid hydrogen + liquid nitrogen (2) Liquid oxygen + liquid argon
(3) Liquid hydrogen + liquid oxygen (4) Liquid nitrogen + liquid oxygen

3. Which one of the following types of drugs reduces fever ? **[AIEEE - 2005, 1½, 225]**
(1) Tranquilizer (2) Antibiotic (3) Antipyretic (4) Analgesic

4. Aspirin is known as : **[AIEEE-2012, 4/120]**
(1) Acetyl salicylic acid (2) Phenyl salicylate
(3) Acetyl salicylate (4) Methyl salicylic acid

5. What is DDT among the following : **[AIEEE-2012, 4/120]**
(1) Greenhouse gas (2) A fertilizer
(3) Biodegradable pollutant (4) Non-biodegradable pollutant

6. The gas leaked from a storage tank of the Union Carbide plant in Bhopal gas tragedy was : **[JEE(Main)-2013, 4/120]**
(1) Methylisocyanate (2) Methylamine (3) Ammonia (4) Phosgene

7. Which of the following compounds is **not** an antacid ? **[JEE(Main)-2015, 4/120]**
(1) Aluminium hydroxide (2) Cimetidine
(3) Phenelzine (4) Ranitidine

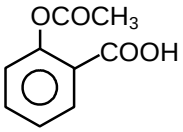
8. Which of the following is an anionic detergent ? **[JEE(Main)-2016, 4/120]**
(1) Sodium lauryl sulphate (2) Cetyltrimethyl ammonium bromide
(3) Glyceryl oleate (4) Sodium stearate

JEE(MAIN) ONLINE PROBLEMS

1. Which one of the following is used as Antihistamine ? **[JEE(Main) 2014 Online (11-04-14), 4/120]**
(1) Omeprazole (2) Chloramphenicol
(3) Diphenhydramine (4) Norethindrone

2. Aminoglycosides are usually used as : **[JEE(Main) 2014 Online (12-04-14), 4/120]**
(1) antibiotic (2) analgesic (3) hypnotic (4) antifertility

3. Phthalic acid reacts with resorcinol in the presence of concentrated H_2SO_4 to give : **[JEE(Main) 2014 Online (12-04-14), 4/120]**
(1) Phenolphthalein (2) Alizarin (3) Coumarin (4) Fluorescein

4.  is used as : **[JEE(Main) 2015 Online (10-04-15), 4/120]**
(1) Antithistamine (2) Antacid (3) Insecticide (4) Analgesic

5. Which artificial sweetener contains chlorine ? **[JEE(Main) 2015 Online (11-04-15), 4/120]**
(1) Sucralose. (2) Alitame (3) Aspartame (4) Saccharin

6. The artificial sweetener that has the highest sweetness value in comparison to cane sugar is : **[JEE(Main) 2016 Online (09-04-16), 4/120]**
(1) Saccharin (2) Sucralose (3) Alitame (4) Aspartame

7. Which of the following is a bactericidal antibiotic ? **[JEE(Main) 2016 Online (10-04-16), 4/120]**
(1) Erythromycin (2) Tetracycline (3) Ofloxacin (4) Chloramphenicol

8. The reason for "drug induced poisoning" is : **[JEE(Main) 2017 Online (08-04-17), 4/120]**
(1) Bringing conformational change in the binding site of enzyme
(2) Binding reversibly at the active site of the enzyme
(3) Binding irreversibly to the active site of the enzyme
(4) Binding at the allosteric sites of the enzyme

9. The correct match between items of List-I and List-II is : **[JEE(Main) 2018 Online (16-04-18), 4/120]**

	List-I		List-II
(A)	Phenelzine	(P)	Pyrimidine
(B)	Chloroxylenol	(Q)	Furan
(C)	Uracil	(R)	Hydrazine
(D)	Ranitidine	(S)	Phenol

(1) (A)-(S), (B)-(R), (C)-(Q), (D)-(P) (2) (A)-(R), (B)-(S), (C)-(P), (D)-(Q)
(3) (A)-(R), (B)-(S), (C)-(Q), (D)-(P) (4) (A)-(S), (B)-(R), (C)-(P), (D)-(Q)

10. The correct match between item–I and item–II. **[JEE(Main) 2019 Online (09-01-19), 4/120]**

	Item–I		**Item–II**
	(drug)		**(test)**
(A)	Chloroxylenol	(P)	Carbylamine test
(B)	Norethindrone	(Q)	Sodium hydrogencarbonate test
(C)	Sulphapyridine	(R)	Ferric chloride test
(D)	Penicillin	(S)	Bayer's test

(1) A $\rightarrow$ Q, B $\rightarrow$ P, C $\rightarrow$ S, D $\rightarrow$ R (2) A $\rightarrow$ Q, B $\rightarrow$ S, C $\rightarrow$ P, D $\rightarrow$ R
(3) A $\rightarrow$ R, B $\rightarrow$ S, C $\rightarrow$ P, D $\rightarrow$ Q (4) A $\rightarrow$ R, B $\rightarrow$ P, C $\rightarrow$ S, D $\rightarrow$ Q

11. The correct match between item (I) and item (ii) is: **[JEE(Main) 2019 Online (11-01-19), 4/120]**

	Item-I		**Item–II**
(A)	Norethindrone	(P)	Anti-biotic
(B)	Ofloxacin	(Q)	Anti-Fertility
(C)	Equanil	(R)	Hypertension
		(S)	Analgesics

(1) (A) → (Q); (B) → (R); (C) → (S)
(2) (A) → (R); (B) →(P); (C) → (S)
(3) (A) → (Q); (B) → (P); (C) → (R)
(4) (A) → (R); (B) →(P); (C) → (R)

12. The correct match between Item I and Item II is : **[JEE(Main) 2019 Online (11-01-19), 4/120]**

Item I		**Item II**	
(A)	Allosteric effect	(P)	Molecule binding to the active site of enzyme
(B)	competitive inhibitor	(Q)	Molecule crucial for communication in the body
(C)	Receptor	(R)	Molecule binding to a site other than the active site of enzyme
(D)	Poison	(S)	Molecule binding to the enzyme covalently

(1) (A) → (P); (B) → (R); (C) → (Q) ; (D) → (S)
(2) (A) → (R); (B) → (P); (C) → (S) ; (D) → (Q)
(3) (A) → (P); (B) → (R); (C) → (S) ; (D) → (Q)
(4) (A) → (R); (B) → (P); (C) → (Q) ; (D) → (S)

Answers

EXERCISE – 1

PART – I

A-1. Ampicillin and amoxicillin.

A-2. Boric acid acts as an antiseptic and as buffering agent.

A-3. Dichlorometaxylenol.

A-4. "The use of chemicals to destroy infectious micro organisms without causing any injury to the host is called as chemotherapy" .

A-5. Mestranol.

A-6. It is bactericidal antibiotic.

A-7. Aspirin.

A-8. Sandalwood oil, benzoin.

A-9. It stabilises the emulsion present in cold cream.

A-10. Polyurethane as fuel and ammonium perchlorate as the oxidiser.

A-11. Bithional is added to soap to reduce undesirable odour, resulting from bacterial decomposition of organic matter on skin.

A-12. (i) Equanil is a tranquiliser and is used for reducing depression.
(ii) Morphine is an alkaloid and is used as an analgesic.

A-13. Target molecules or drug-targets are the macromolecules such as carbohydrates, proteins, lipids, nucleic acids with which the drug interacts in our body to produce therapeutic effect.

A-14. Medicine should always be taken after consulting a doctor because any medicine if taken in overdoes may act as a poison. Moreover, only a doctor can diagnose the disease properly and prescribe the correct medicine in appropriate dose.

A-15. Drug is held to the amino acid residues of the protein present on the active site of the enzyme through forces such as ionic bonding, hydrogen bonding, van der Waals interaction or dipole-dipole interaction.

A-16. A 2-3% solution of iodine in alcohol-water mixture is called tincture of iodine. It is used as an antiseptic.

A-17. Alitame is a high potency sweetener. It is about 2000 times sweeter than sucrose, therefore, the control of sweetness of food is difficult while using it.

A-18. (i) Sodium benzoate (ii) Potassium metabisulphite.

A-19. The two examples of synthetic detergents are :
(i) Sodium lauryl sulphate (ii) Sodium dodecyl benzenesulphonate.

A-20. Ortho-sulphobenzimide, also known as saccharine can be used because it is non-nutritive and is excreted from the body in urine.

A-21. Cleansing action of soaps is because they are soluble in water and can emulsify grease and take it away in the water along with dirt present on grease. Now Ca^{2+} and Mg^{2+} ion present in water react with soap and make it insoluble in water.

$2C_{17}H_{35}COONa + MgCl_2 \longrightarrow (C_{17}H_{35}COO)_2Mg\downarrow + 2NaCl$

Soap (soluble in water) (Hardness of water) White ppt (Insoluble in water)

These insoluble soaps are useless as cleansing agent.

A-22. We will use synthetic detergent because calcium salts of detergents are soluble in water but that of soap are insoluble in water. Therefore, soap will form curdy white precipitate with calcium ions and some soap will be wasted in the process.

A-23. (i) $\underbrace{CH_3(CH_2)_{10}CH_2}_{\text{Hydrophobic}}-\underbrace{OSO_3^-Na^+}_{\text{Hydrophilic}}$

or non-polar part or polar part

(ii) $\underbrace{CH_3(CH_2)_{15}}_{\text{Hydrophobic}}-\underbrace{\overset{+}{N}(CH_3)_3Br^-}_{\text{Hydrophilic}}$

or non-polar part or polar part

(iii) $\underbrace{CH_3(CH_2)_{16}}_{\text{Hydrophobic part}}-\underbrace{COO(CH_2CH_2O)_nCH_2CH_2OH}_{\text{Hydrophilic part}}$

A-24. **(i) Hypertension :** Tranquilizers are effective in such mental disorder when ordinary hypnotics or sedatives fail. These are called as psychotherapeutic drugs. e.g., Barbituric acid.
(ii) General body pain : The chemicals which are used for relieving pain are called ANALGESICS. e.g. Aspirin.

A-25. Antacids and antiallergic drugs do not interfere with the function of each other because they work on different receptors. Thus, antihistamines (antiallergic drugs) do not affect the secretion of acid in stomach because they do not interact with the receptors present in the stomach wall.

A-26. Drugs which can inhibit the enzymes which catalase the degradation of noradrenaline are needed. This will slow down the process of metabolism of noradrenaline and will thus help in counteracting the effect of depression. **Iproniarid and phenelzine** are two such drugs.

A-27. Over production of hydrochloric acid in the stomach causes acidity. So, sodium bicarbonate or magnesium or aluminium hydroxide are used as treatment of acidity. However excessive bicarbonate can make the stomach alkaline and trigger the production of even more acid. But the drugs cimetidine and rantidine work in different way. They prevent the interaction of histamine with the receptors present in the stomach wall and this results in release of lesser amount of acid.

A-28. They prevent the release of HCl in the stomach.

A-29. Histamine is a potent vasodilater. (A chemical agent that causes dilation of the blood vessels)
(i) It contracts muscles in the gut and bronchi.
(ii) It relaxes some other muscles e.g., in the wall of blood vessels.
(iii) It is responsible for congestion in the nose associated with common cold and allergies.
(iv) It stimulates the release of pepsin and HCl in the stomach.

A-30. (i) Aspirin
(ii) 0.2 % solution of phenol acts as an antiseptic whereas 1% solution acts as a disinfectant.

A-31. The chemical which are used to stop undesirable change in food caused by microorganism and save them from spoiling are called preservatives.

PART – II

A-1.	(C)	**A-2.**	(D)	**A-3.**	(B)	**A-4.**	(B)	**A-5.**	(A)
A-6.	(B)	**A-7.**	(B)	**A-8.**	(C)	**A-9.**	(B)	**A-10.**	(C)
A-11.	(D)	**A-12.**	(C)	**A-13.**	(C)	**A-14.**	(B)		

PART – III

1.	(B)	**2.**	(B)	**3.**	(D)	**4.**	(BC)	**5.**	(D)

EXERCISE – 2

JEE(MAIN) OFFLINE PROBLEMS

1.	(3)	**2.**	(3)	**3.**	(3)	**4.**	(1)	**5.**	(4)
6.	(1)	**7.**	(3)	**8.**	(1)				

JEE(MAIN) ONLINE PROBLEMS

1.	(3)	**2.**	(1)	**3.**	(4)	**4.**	(4)	**5.**	(1)
6.	(3)	**7.**	(3)	**8.**	(3)	**9.**	(2)	**10.**	(3)
11.	(3)	**12.**	(4)						

Additional Problems For Self Practice (APSP)

This Section is not meant for classroom discussion. It is being given to promote self-study and self testing amongst the Resonance students.

PART - I : PRACTICE TEST-1 (IIT-JEE (MAIN Pattern))

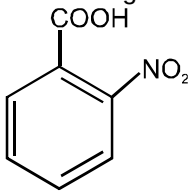
Max. Time : 1 Hr. **Max. Marks : 120**

Important Instructions

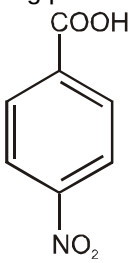
1. The test is of **1 hour** duration.
2. The Test Booklet consists of **30** questions. The maximum marks are **120.**
3. Each question is allotted **4 (four)** marks for correct response.
4. Candidates will be awarded marks as stated above in Instructions No. 3 for correct response of each question. **¼ (one fourth)** marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
5. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 4 above.

1. 2-Acetoxy benzoic acid is used as an :
(1) antimalarial (2) antidepressant (3) antiseptic (4) antipyretic

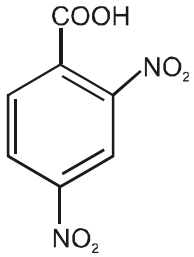
2. Decreasing order of melting point of compound I to IV follows.



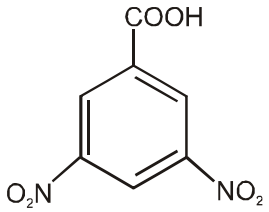
I



II



III



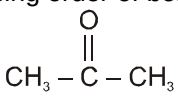
IV

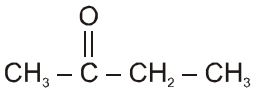
(1) I > II > III > IV (2) IV > III > II > I (3) III > IV > II > I (4) III > IV > I > II

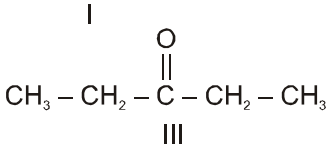
3. A drug that is antipyretic as well as analgesic is :
(1) chloroquin (2) penicillin
(3) paracetamol (4) chloropromazine hydrochloride

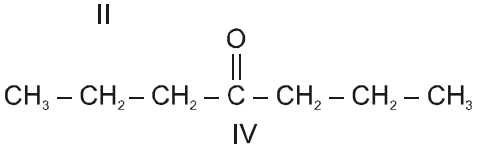
4. Which of the following compounds is used as a body deodorant ?
(1) Aspirin (2) Omeprazole (3) Indigosol-O (4) p-Chlorometaxylenol

5. Decreasing order of boiling point of I to IV follow.


I


II


III


IV

(1) I > II > III > IV (2) IV > III > II > I (3) II > III > IV > I (4) I > IV > III > II

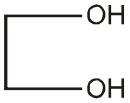
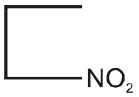
6. Bithional is an example of :
(1) disinfectant (2) antiseptic (3) antibiotic (4) analgesic

7. A is a lighter phenol and B is an aromatic carboxylic acid. Separation of a mixture of A and B can be carried out easily by using a solution of
(1) Sodium hydroxide (2) Sodium sulphate (3) Calcium chloride (4) Sodium bicarbonate

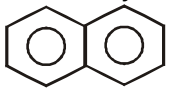
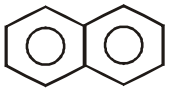
8. Novalgin is a common :
(1) Analgesic (2) Antibiotic (3) Antipyretic (4) Both (1) and (3)

9. Which of the following is/are antidepressant drug/s ?
(1) Cocaine (2) Benzedrine (3) Tofranil (4) All the three

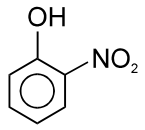
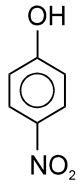
10. Salol can be used as :
(1) Antiseptic (2) Antipyretic (3) Analgesic (4) Disinfectant

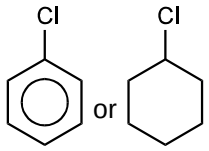
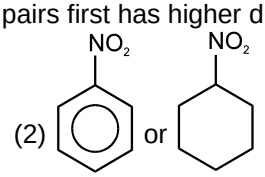
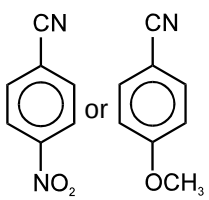
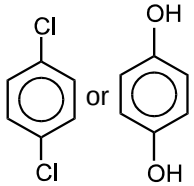
11. Which of the following compounds can be separated by water ?
(1)  (2)  (3)  (4) 

12. A mixture of two aromatic compound A and B when dissolve in NaOH, A is soluble and its residue B gives 2, 4 DNP test, identify compound A and B.
(1) Ph–COOH and Ph–OH (2) Ph – C(=O) – Ph and Ph–NH_2
(3) Ph–OH and Ph–NH_2 (4) Ph – OH and Ph – C(=O) – Ph

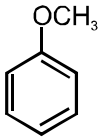
13. When a mixtrue of compound A & B dissolves in H_2O. A is soluble and gives smell of ammonia on heating with addition of conc. NaOH. Its residue B has sublimable nature. Identify A and B.
(1) $ArCONH_2$ and ArCOOH (2) R – C(=O) – NH_2 and 
(3)  and Ar – NO_2 (4) Ar – C(=O) – NH_2 and 

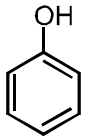
14. Which of the following statement is not true ?
(1) Small aliphatic compound with at least two functional group which can form hydrogen bond are water soluble
(2) Most of the aromatic compounds are water insoluble due to large hydrophobic group of six carbon atom.
(3) Aromatic amines are soluble in aq. NaOH but insoluble in aq. HCl.
(4) Aromatic hydroxy compounds are soluble in aq. NaOH solution.

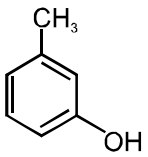
15. The correct orders about compounds I and II are :
 I  II
(1) B.P. $\longrightarrow$ I < II (2) Water solubility $\longrightarrow$ I > II
(3) Acid strength $\longrightarrow$ I < II (4) Melting point $\longrightarrow$ II > I

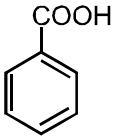
16. In which of the following pairs first has higher dipole moment than second ?
(1)  (2)  (3)  (4) 

17. Which of the following compounds does not form salt with NaOH ?

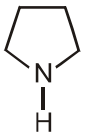
(1) 

(2) 

(3) 

(4) 

18. The boiling points of two miscible liquids, which do not form azeotropic mixture, are close to each other. Their separation is best carried out by :
(1) vacuum distillation (2) fractional distillation (3) steam distillation (4) redistillation

19. Which will have higher dipole moment than 

?

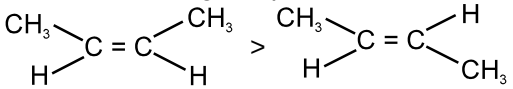
(1) 

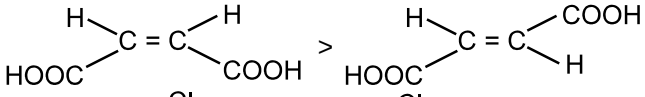
(2) 

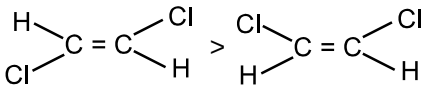
(3) 

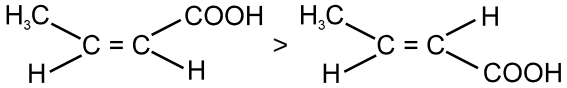
(4) 

20. The correct order for the given pair of isomers is :

(1)  (Melting point)

(2)  (Dipole moment)

(3)  (Boiling point)

(4)  (Water solubility)

21. The enzyme which hydrolyses cellulose into glucose is :
(1) Invertase (2) Maltase (3) Emulsin (4) Lactase

22. Which of the following sets of bases is present both in DNA and RNA ?
(1) Adenine, uracil, thymine (2) Adenine, guanine, cytosine
(3) Adenine, guanine, uracil (4) Adenine, guanine, thymine

23. The vitamin which is water soluble and antioxidant is :
(1) Vitamin E (2) Vitamin D (3) Vitamin C (4) Vitamin B_1

24. Which base is found only in the nucleotides of RNA ?
(1) Adenine (2) Uracil (3) Guanine (4) Cytosine

25. The couplings between base units of DNA is through :
(1) Hydrogen bonding (2) Electrostatic bonding
(3) Covalent bonding (4) Vander Waals forces

26. Mixture of chloroxylenol and terpineol acts as :
(1) Analgesic (2) Antiseptic (3) Antipyretic (4) Antibiotic

27. In a protein molecule various amino acids are linked together by :
(1) dative bond (2) α-glycosidic bond (3) β-glycosidic bond (4) peptide bond

28. Which of the following in an analgesic?
(1) Chloromycetin (2) Novalgin (3) Penicillin (4) Streptomycin

29. Artificial sweetner which is stable under cold conditions only is :
(1) Saccharine (2) Sucralose (3) Aspartame (4) Alitame

30. Which of the following hormones is produced under the condition of stress which stimulates glycogenolysis in the liver of human being ?
(1) Thyroxin (2) Insulin (3) Adrenaline (4) Estradiol

Practice Test-1 (IIT-JEE (Main Pattern))

OBJECTIVE RESPONSE SHEET (ORS)

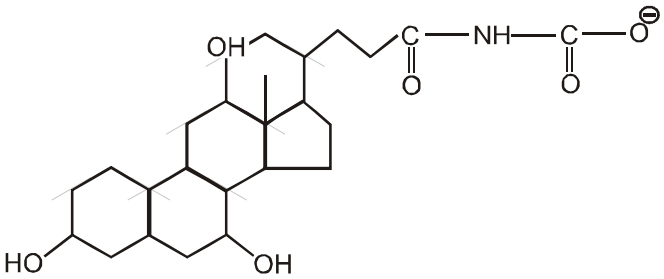
Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25	26	27	28	29	30
Ans.										

PART-II : NATIONAL STANDARD EXAMINATION IN CHEMISTRY (NSEC) STAGE-I

1. Drug which helps to reduce anxiety and brings about calmness is called as : **[NSEC-2001]**
(A) analgesic (B) diuretioc (C) tranquilizer (D) antihistamine

2. Which of the following vitamins are in water soluble ? **[NSEC-2001]**
(A) A and E (B) A and E (C) B and C (D) D and E

3.



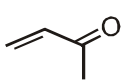
The compound shown above is : **[NSEC-2001]**
(A) a bile salt (B) a cholesterol
(C) vitamin D_3 (D) a steroid hormone

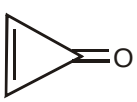
4. The molecule that will have dipole moment is : **[NSEC-2001]**
(A) trans 3-hexene (B) trans-2-pentene
(C) 2,2-dimethyl propane (D) 2,2,3,3-tetramethyl butane

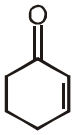
5. Which of the following is an unsaturated fatty acid ? **[NSEC-2001]**
(A) Stearic acid (B) Linolic acid (C) Lauric acid (D) Palmatic acid.

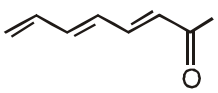
6. A person suffered from injury and there was considerable delay in clotting of blood. It may be due to the deficiency of **[NSEC-2002]**
(A) vitamin A (B) vitamin B (C) vitamin C (D) vitamin K

7. The compound having the highest dipole moment is **[NSEC-2003]**

(A) 

(B) 

(C) 

(D) 

8. Transport of oxygen is an important function of blood. Partial pressure of O_2 is highest and lowest, respectively in **[NSEC-2003]**
(A) muscles and heart (B) lungs and muscles
(C) heart and lungs (D) muscles and lungs.

9. Milk of magnesia used as a medicine for treating indigestion is a substance that : **[NSEC-2003]**
(A) helps in disintegration of food products leading to their facile metabolism
(B) combines with gastric hydrochloric acid thereby enhancing the latter`s efficiency
(C) improves the enzymatic activities inside the stomach
(D) neutralises excess acidity, providing a buffered medium inside the stomach.

10. Calcium gluconate syrup and calcium phosphate tablets are calcium supplements used to treat calcium deficiency. However, calcium gluconate is preferred over the latter because it is **[NSEC-2003]**
(A) more easily absorbed into the blood (B) released slowly in the body
(C) less toxic (D) more tasty

11. The fuel that is considered most polluting is : **[NSEC-2004]**
(A) petrol (B) coke (C) furnace oil (D) CNG.

12. The radioisotope used in the treatment of hyperthyroidism is : **[NSEC-2004]**
(A) Co-60 (B) Na-24 (C) I-131 (D) I-123

13. The haeme group found in haemoglobin **[NSEC-2005]**
(A) co-ordinates the iron atom in the plane of the haeme only when oxygen is bound
(B) contains centrally bound Fe(III) atom
(C) is covalently bound to the haemoglobin
(D) is held within the central cavity formed between the four haemoglobin subunits.

14. Proteins present inside the cell membrane are stabilized by **[NSEC-2007]**
(A) hydrogen bond (B) disulfide bond (C) hydrophobic force (D) phospho-diester bond

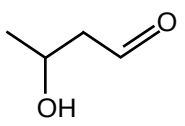
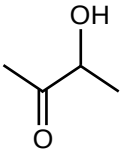
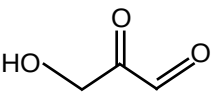
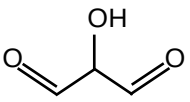
15. Reversible binding of oxygen occurs through **[NSEC-2008]**
(A) Fe (B) Cu (C) Mg (D) Ca

16. Essential vitamin required for the production of RBCs is **[NSEC-2012]**
(A) Folic acid (B) Nicotinic acid (C) Pantothenic acid (D) None of the above

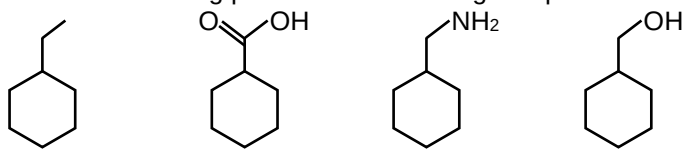
17. When a person suffers from typhoid, the metabolic process stimulates in the body to fight against this disease is synthesis of **[NSEC-2014]**
(A) Lipid (B) carbohydrate (C) protein (D) DNA

18. Wood or cattle dung ash is used for cleaning cooking utensils in many parts of India. The statement that is **not true** for this ash is : **[NSEC-2015]**
(A) It largely consists of metal oxides and silicates because non-metals are removed as gaseous compounds during buring of the wood/dung cakes.
(B) when added to water, it forms alkaline solution with pH~8 and above, which helps to remove oily substances from the utensils.
(C) several chemical components of ash remain undissolved as solids in water and these solids help in cleaning by providing scrubbing action.
(D) if left moist for a few hours in air, it slowly turns acidic because of oxidative decomposition.

19. Compound 'Y' (molar mass = 88.12 g mol^{-1}) containing 54.52% carbon, 9.17% hydrogen and 36.31% oxygen gives a reddish-brown precipitate in Fehling's test. 'Y' is **[NSEC-2018]**

(A) 
(B) 
(C) 
(D) 

20. The correct order of boiling points of the following compounds is **[NSEC-2018]**



(I) (II) (III) (IV)

(A) III < IV < II < I (B) I < III < IV < II (C) I < II < III < IV (D) IV < III < I < II

21. Among the following, the compound that has the highest dipole moment is **[NSEC-2018]**
(A) CH_3COOCH_3 (B) CH_3CONH_2 (C) $CH_3COC_2H_5$ (D) CH_3COCl

PART - III : PRACTICE TEST-2 (IIT-JEE (ADVANCED Pattern))

Max. Time : 1 Hr. **Max. Marks : 63**

Important Instructions

A. General :

1. The test is of 1 hour duration.
2. The Test Booklet consists of 21 questions. The maximum marks are 63.

B. Question Paper Format

3. Each part consists of five sections.
4. Section 1 contains 7 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which ONE is correct.
5. Section 2 contains 7 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which ONE OR MORE THAN ONE are correct.
6. Section 3 contains 3 questions. The answer to each of the questions is a single-digit integer, ranging from 0 to 9 (both inclusive).
7. Section 4 contains 1 paragraphs each describing theory, experiment and data etc. 3 questions relate to paragraph. Each question pertaining to a partcular passage should have only one correct answer among the four given choices (A), (B), (C) and (D).
8. Section 5 contains 1 multiple choice questions. Question has two lists (list-1 : P, Q, R and S; List-2 : 1, 2, 3 and 4). The options for the correct match are provided as (A), (B), (C) and (D) out of which ONLY ONE is correct.

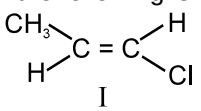
C. Marking Scheme

9. For each question in Section 1, 4 and 5 you will be awarded 3 marks if you darken the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases, minus one (– 1) mark will be awarded.
10. For each question in Section 2, you will be awarded 3 marks. If you darken all the bubble(s) corresponding to the correct answer(s) and zero mark. If no bubbles are darkened. No negative marks will be answered for incorrect answer in this section.
11. For each question in Section 3, you will be awarded 3 marks if you darken only the bubble corresponding to the correct answer and zero mark if no bubble is darkened. No negative marks will be awarded for incorrect answer in this section.

SECTION-1 : (Only One option correct Type)

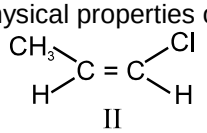
This section contains 7 multiple choice questions. Each questions has four choices (A), (B), (C) and (D) out of which Only ONE option is correct.

1. Which of the following is correct set of physical properties of the geometrical isomers ?



I

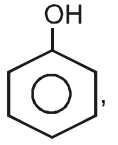
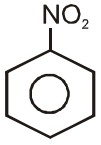
&

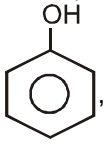
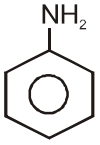


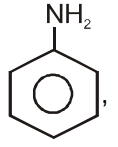
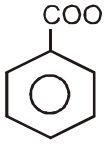
II

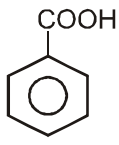
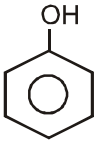
	Dipole moment	Boiling point	Melting point	Stability
(A)	I > II	I > II	II > I	I > II
(B)	II > I	II > I	II > I	II > I
(C)	I > II	I > II	I > II	I > II
(D)	II > I	II > I	I > II	I > II

2. A mixture of organic compounds A & B when dissolve in NaOH, A is soluble and its residue B gives positive test with Zn/ NH_4Cl followed by $AgNO_3$ + NH_4OH, (mulliken's barker test). Identify A & B

(A)  , 

(B)  , 

(C)  , 

(D)  , 

3. Which is/are the correct method for separating a mixture of benzoic acid, p-methylaniline & phenol ?

(A) $\xrightarrow{\text{aq. } NaHCO_3} \xrightarrow{\text{aq. NaOH}}$ (B) $\xrightarrow{\text{aq. HCl}} \xrightarrow{H_2O}$

(C) $\xrightarrow{\text{aq. NaOH}} \xrightarrow{\text{aq. } NaHCO_3}$ (D) $\xrightarrow{\text{aq. NaOH}} \xrightarrow{\text{aq. HCl}}$

4. Which of the following is not an antiseptic drug ?

(A) Iodoform (B) Dettol (C) Gammexane (D) Gentian violet

5. Which of the following represents a double base propellant ?

(A) Nitromethane (B) Nitrocellulose + nitroglycerine

(C) N_2O_4 + monomethylhydrazine (D) Liquid H_2 + liquid O_2

6. Which alcohol has least solubility in water ?

(A) Ethanol (B) Propan-1-ol (C) Butan-1-ol (D) Pentan-1-ol

7. Anthracene is purified by :

(A) filtration (B) distillation (C) crystallisation (D) sublimation

Section-2 : (One or More than one options correct Type)

This section contains 7 multipole choice questions. Each questions has four choices (A), (B), (C) and (D) out of which ONE or MORE THAN ONE are correct.

8. Which of the following are not used as food preservatives?

(A) Table salt (B) Sodium hydrogencarbonate

(C) Cane sugar (D) Benzoic acid

9. Compounds with antiseptic properties are _____.

(A) $CHCl_3$ (B) CHI_3

(C) Boric acid (D) 0.3 ppm aqueous solution of Cl_2

10. Which of the following statements are correct about barbiturates?

(A) Hypnotics or sleep producing agents.

(B) These are tranquilizers.

(C) Non-narcotic analgesics.

(D) Pain reducing without disturbing the nervous system.

11. Which of the following compounds are administered as antacids?

(A) Sodium carbonate (B) Sodium hydrogencarbonate

(C) Aluminium carbonate (D) Magnesium hydroxide

12. Amongst the following antihistamines, which are antacids?

(A) Ranitidine (B) Brompheniramine (C) Terfenadine (D) Cimetidine

13. Which of the following are anionic detergents?

(A) Sodium salts of sulphonated long chain alcohol.

(B) Ester of stearic acid and polyethylene glycol.

(C) Quarternary ammonium salt of amine with acetate ion.

(D) Sodium salts of sulphonated long chain hydrocarbons.

14. Which of the following statements are correct?

(A) Cationic detergents have germicidal properties

(B) Bacteria can degrade the detergents containing highly branched chains.

(C) Some synthetic detergents can give foam even in ice cold water.

(D) Synthetic detergents are not soaps.

Section-3 : (One Integer Value Correct Type.)

This section contains 3 questions. Each question, when worked out will result in one integer from 0 to 9 (both inclusive)

15. How many of the following are antifical sweeteners,

(i) Aspartame (ii) Saccharin (iii) Sucralose

(iv) Bithionol (v) Terpineol (vi) Chloroxylenol

(vii) Alitame (viii) Sodium Benzoate (ix) Sorbic acid

16. In how many of the following drugs, S is present.

(i) Histamine	(ii) Cimetidine	(iii) Ranitidine
(iv) Terfenadine	(v) Phenelzine	(vi) Veronal
(vii) Valium	(viii) Sulphonamide	(ix) Sulphapyridine

17. From the given set of drugs, how many of them can be used as antibiotics.

(i) Penicillin	(ii) Erythromycin	(iii) Ofloxacin.
(iv) Tetracycline	(v) Chloramphenicol	(vi) Salvarsan
(vii) Prontosil	(viii) Bithional	(ix) Chloroxylenol

SECTION-4 : Comprehension Type (Only One options correct)

This section contains 1 paragraphs, each describing theory, experiments, data etc. 3 questions relate to the paragraph. Each question has only one correct answer among the four given options (A), (B), (C) and (D)

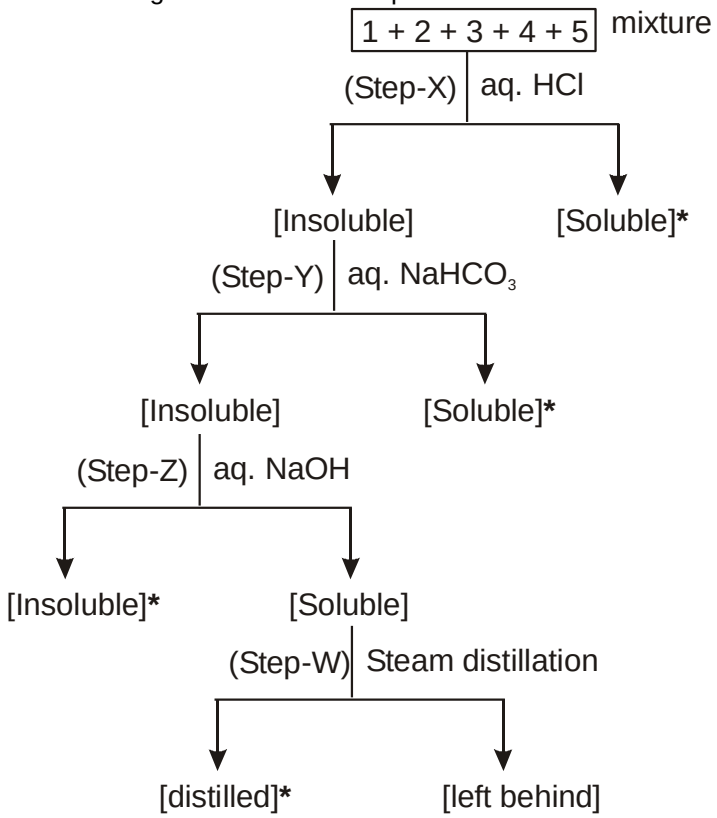
Paragraph for Questions 18 to 20

A water insoluble organic mixture contained following compounds

(1) Benzoic acid (2) Salicylaldehyde

(3) p-Hydroxybenzaldehyde (4) α-Naphthylamine (5) Naphthalene

The following sequence of reagents are used to separate this mixture



18. Soluble compound at step X is formed by compound :

(A) Benzoic acid (B) p-Hydroxybenzaldehyde

(C) α-Naphthylamine (D) Naphthalene

19. Soluble compound at step Y is formed by compound.

(A) Benzoic acid (B) p-Hydroxybenzaldehyde

(C) α-Naphthylamine (D) Naphthalene

20. Insoluble compound at step Z is formed by compound.

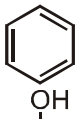
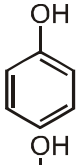
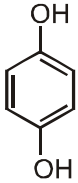
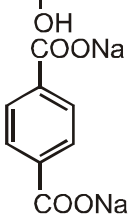
(A) p-Hydroxybenzaldehyde (B) Salicylaldehyde

(C) α-Naphthylamine (D) Naphthalene

SECTION-5 : Matching List Type (Only One options correct)

This section contains 1 questions, each having two matching lists. Choices for the correct combination of elements from List-I and List-II are given as options (A), (B), (C) and (D) out of which one is correct

21

	Column-I		**Column-II**
P		**1**	insoluble in water with $\mu = 0$.
Q		**2**	more soluble in water with $\mu \neq 0$.
R		**3**	most soluble in water with $\mu = 0$.
S		**4**	slightly soluble in water with $\mu \neq 0$.

Codes :

	P	Q	R	S		P	Q	R	S
(A)	1	2	3	4	(B)	1	4	2	3
(C)	3	4	1	2	(D)	4	3	2	1

Practice Test-2 (IIT-JEE (ADVANCED Pattern)

OBJECTIVE RESPONSE SHEET (ORS)

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ans.										
Que.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.										
Que.	**21**									
Ans.										

APSP Answers

PART - I

1.	(4)	**2.**	(2)	**3.**	(3)	**4.**	(4)	**5.**	(2)
6.	(1)	**7.**	(4)	**8.**	(4)	**9.**	(4)	**10.**	(1)
11.	(1)	**12.**	(4)	**13.**	(2)	**14.**	(3)	**15.**	(4)
16.	(2)	**17.**	(1)	**18.**	(2)	**19.**	(2)	**20.**	(2)
21.	(3)	**22.**	(2)	**23.**	(3)	**24.**	(2)	**25.**	(1)
26.	(2)	**27.**	(4)	**28.**	(2)	**29.**	(3)	**30.**	(3)

PART-II

1.	(C)	**2.**	(C)	**3.**	(A)	**4.**	(B)	**5.**	(B)
6.	(D)	**7.**	(B)	**8.**	(B)	**9.**	(D)	**10.**	(A)
11.	(B)	**12.**	(C)	**13.**	(A)	**14.**	(D)	**15.**	(A)
16.	(A)	**17.**	(C)	**18.**	(D)	**19.**	(A)	**20.**	(B)
21.	(B)								

PART - III

1.	(C)	**2.**	(A)	**3.**	(A)	**4.**	(C)	**5.**	(B)
6.	(D)	**7.**	(D)	**8.**	(AC)	**9.**	(BC)	**10.**	(AB)
11.	(BD)	**12.**	(AD)	**13.**	(AD)	**14.**	(ACD)		
15.	4 (i, ii, iii and vii)	**16.**	4 (ii, iii, viii, ix)	**17.**	7 (i to vii only)	**18.**	(C)	**19.**	(A)
20.	(D)	**21.**	(B)						

APSP Solutions

PART - I

2. Melting point depends on symmetry of molecule.

5. Boiling point $\propto$ molecular weight.

7. Lighter phenol and aromatic carboxylic acid both reacts with sodium hydroxide, sodium sulphate and calcium chloride. While only aromatic carboxylic acid reacts with sodium bicarbonate. So, they can be seperated by sodium bicarbonate
$\therefore$ option (4) is correct.

8. Novalgin is a common analgesic and antipyretic.

9. This is informative question.

10. Salol is used as intestinal antiseptic.

11. Lower alcohol are soluble in water.

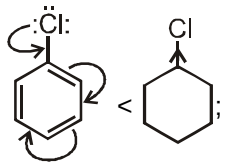
12. Ar–OH dissolve in NaOH and carbonyl group gives +ve test with 2,4-DNP so $Ph-\underset{\underset{O}{\|}}{C}-Ph$ gives +ve 2,4DNP test.

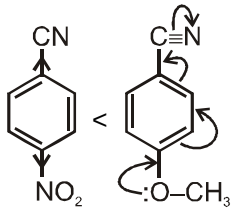
13. With conc. NaOH, amide gives smell of ammonia and aliphatic amides is soluble in H_2O.

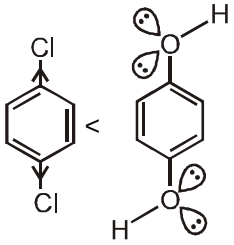
14. Aromatic amines are soluble in aq. HCl due to salt formation.

15. Correct orders are

B.P.	=	II > I	(pera > ortho)
H_2O (sol.)	=	II > I	(pera > ortho)
Acid strength	=	II > I	(pera > ortho)

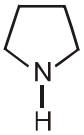
16. (1) 

; (3) 

; (4) 

17. Anisol does not form salt with NaOH.

18. If boiling points are closer then best separation is done by fractional distillation.

19. Due to more electronegativity of oxygen than N,  has higher dipole moment than  .

20. Dipole moment of cis isomer > dipole moment of trans isomer and hence water solubility. (cis isomer is greater than trans isomer).

21. The enzyme which hydrolyses cellulose into glucose is emulsin.

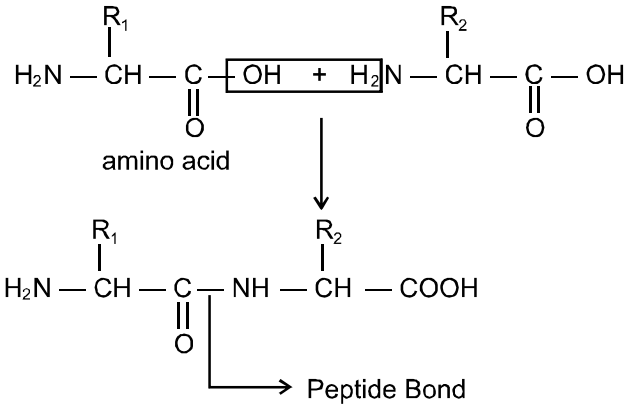
22. Adenine, guanine, cytosine sets of bases is present both in DNA and RNA.

23. Vitamin C is water soluble and antioxidant.

24. Uracil base is found only in the nucleotides of RNA

25. The couplings between base units of DNA is through hydrogen bonding.

26. It is fact.

27. 

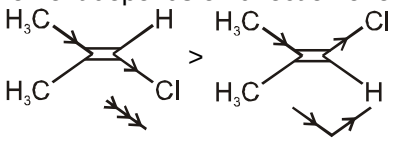
28. Novalgin is an analgesic it is a fact.

29. Aspartame is stable at cold conditions but unstable at cooking temperature.

30. Adrenaline hormone is produced by adrenal glands after receiving a massage from the brain that a stressfull situation has presented itself. It is commonly known as ***fight or flight*** hormone.

PART - III

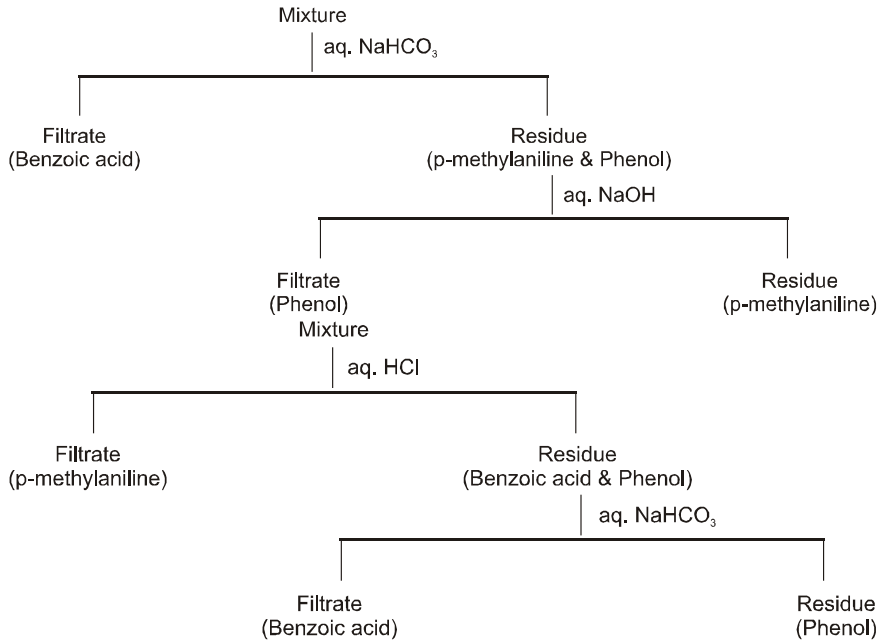
1. Dipole moment depends on direction of electron flow i.e.



melting point and boiling point also depends on dipole moment if H-bonding is absent. Greater the dipole moment, greater the melting point and boiling point.

2. $Ar–NO_2 \xrightarrow[\Delta]{Zn/NH_4Cl} ArNHOH \xrightarrow[NH_4OH]{AgNO_3^+} Ag\downarrow$

3.



4. Gammexane is insecticide.

6. Pentan-1-ol has larger alkyl group which decreases H-bonding so least soluble in water.

7. Anthracene (solid) $\underset{cool}{\overset{heat}{\rightleftharpoons}}$ vapours

15. 4 (i, ii, iii and vii) are antifical sweeteners.

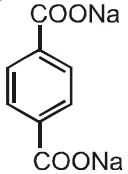
16. Cimetidine, Ranitidine, Sulphonamide and Sulphapyridine has "S" present in it.

17. Bithional and Chloroxylenol are antiseptics.

18. $–NH_2$ containing compound form salt with HCl.

19. –COOH group forms salt with $NaHCO_3$.

20. Naphthalene does not form salt with HCl, $NaHCO_3$ and NaOH.

21. Benzene is non-polar, phenol has –OH group so slightly soluble, p-hydroxyphenol has 2–OH group so more soluble on water,  is salt so is most soluble in water.