

CHEMISTRY IN EVERY DAY LIFE

LONG ANSWER QUESTIONS

1. Explain the different classifications of drugs.

Classifications of drugs: Drugs are classified in different ways.

i) On the basis of drug action: Based on the actions of drugs on particular biochemical processes they are classified as

- | | | |
|---------------------------------|--------------------------|----------------------|
| i) Antibacterials | ii) Antibiotics | iii) Hypnotics |
| iv) Sedatives and tranquilizers | v) Cardio vascular drugs | vi) Antiseptics etc. |

ii) On the basis of molecular targets: Biomolecules like Carbohydrates, lipids, proteins, nucleic acids etc. react with drugs. These biomolecules are called drug targets or simply target molecules.

iii) On the basis of chemical structure: The drugs with some common structural features generally show similar pharmacological activity.

Ex: Sulphonamides have common structural feature. So they have same chemotherapeutic action.

2. Discuss about (i) analgesics and (ii) antipyretics.

Ans: Analgesics: Analgesics either reduce or totally abolish pain without causing disturbances of nervous system.

These are classified as

a) Narcotic analgesics: These are most potent and clinically useful agents causing depression of central nervous system and at the same time act as strong analgesics.

Ex: Morphine, Codeine, Heroin etc.

The term narcotic drugs now mean addictive drugs. When these are administered in medicinal doses, relieve pain and produce sleep. In high doses they produce coma, convulsions and finally death.

Uses: These analgesics are chiefly used for the relief of post operative pain, cardiac pain, cancer pain, cough and induce sleep in the presence of pain.

b) Non - narcotic analgesics: These drugs are analgesics but they have no addictive properties. Their analgesic use is limited to mild aches and pains like backache and headache.

Ex: Aspirin, Ibuprofen etc.

Aspirin: Chemically aspirin is ortho acetyl salicylic acid.

Preparation: Acetylation of salicylic acid with acetic anhydride gives aspirin.

Uses:

i) As anti inflammatory, analgesic and antipyretic.

ii) It inhibits platelet function and its anti blood clotting action provides to prevent heart attacks.

ii) Antipyretics: Antipyretics are defined as those substances which reduce body temperature in fever.

Antipyretic drug affects the hypothalamic centre which in turn activates the dilation of the peripheral blood vessels and increases the rate of **perspiration** which cause the body to loose heat and subsequently lowers the body temperature.

Antipyretics have no effect on body temperature when it is in the normal range.

Ex: Analgin, Paracetamol. Phenacetin etc.

3. Write a note on i) antimicrobials ii) antiseptics and iii) disinfectants

i) Antimicrobials: Antimicrobials kill or inhibit the growth of organism that cause disease. They increase immunity and resistance to infection of the body.

The control of microbial disease is achieved by

a) a drug that kills micro organisms in the body.

b) a drug which inhibits the growth of organism.

Ex: Lysozyme, Lactic acid, Hydrochloric acid in stomach.

ii) Antiseptics: The chemical compounds that kill (or) prevent the growth of microorganisms.

These are applied to living tissues like wounds, cuts, ulcers and diseased skin surfaces. They are no ingested.

Ex:

- Mixture of chloroxylenol and terpineol is antiseptic dettol.

- Bithionol is added to soaps to impart antiseptic.
- 2 – 3% Iodine in alcoholic aq. Solution known as tincture of iodine is antiseptic.
- Iodoform is another antiseptic.
- Boric acid solution is a weak antiseptic for eyes.

iii) Disinfectants: These are chemical compounds used for killing or preventing the growth of microorganisms.

These are applied to inanimate objects like floors, drainage systems etc.

Ex:

- 4% aq solution of formaldehyde called formalin is disinfectant.
- 0.3 ppm chlorine aq. Solution is disinfectant.

Same chemicals may be used as antiseptic but 1% phenol solution is disinfectant.

4. Explain antacids, antihistamines and food preservatives

Antiacids: Chemicals that remove the excess acid in the stomach and maintain the pH to normal level are called antiacids.

These compounds do not allow the formation of acid in the stomach. Excess of acid produced in the stomach causes irritation and pain and if it is severe it leads to ulcers.

Ex:

- Weak bases like Magnesium hydroxide, magnesium carbonate, magnesium trisilicates aluminium hydroxide gel, sodium bicarbonate etc. are antacids.
- Omeprazole and lansoprazole are antacids used recently..

Antihistamines: Histamine a chemical stimulates the secretion of pepsin and hydrochloric acid the stomach. Histamine is also responsible for the nasal congestion associated with common cold and allergic response to pollen, food product, dust mite, house dust, sheep wool, human hair etc.

Antihistamines interfere with the natural action of histamine by binding sites of receptor where histamine exerts its effect.

Antihistamines prevent the interaction of histamine with receptors of the stomach wall thus producing less amount of acid.

Antihistamines do not effect the secretion of acid in the stomach.

Examples for antihistamines are Cimetidine, Ranitidine, Dimetap, Sardane etc.

Food preservatives:

- The chemicals which are used to enhance the appeal and preservation of the food are called food preservatives.

- On long standing food loses colour, texture and appetitive appeal. If food preservatives are added they prevent spoilage of food due to microbial growth.

Ex: Sodium benzoate, salts of propionic acid and sorbic acid etc.

1. **Antioxidants:** These are more reactive towards oxygen and retard the action of oxygen so preserve the food.

Ex: Generally used antioxidants are butylated hydroxy toluene (BHT) and butylated hydroxy anisole (BHT).

SO₂ and SO_{2/3} are used as antioxidants for wine, beer, sugar, syrup vegetables etc.

2. Tetrazine, carotenes are examples for food dyes.

5. Write a note on i) Antibiotics ii) Artificial Sweetening agents

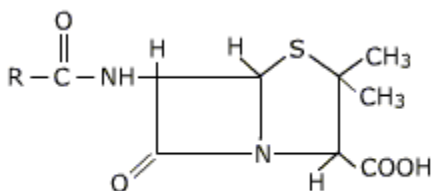
i) Antibiotics:

Antibiotics (Greek, *anti*, against, and *bios*, life) are special kind of chemotherapeutic agent usually obtained from living organism. It is a metabolic product of one organism that in very small amount detrimental or inhibitory to other microorganism.

Lists of common antibiotics

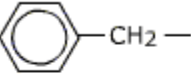
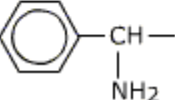
a) **Penicillin:** They are produced by micro-organisms that are toxic to other micro organisms. Alexander Fleming in 1920 found that bacteria do not flourish in nutrient agar surrounded by the fungus *Penicillium notatum* Westling. He found that this fungus produces antibiotic called penicillin. There are many varieties of penicillin with the empirical formula C₉H₁₁O₄SN₂R. Penicillin is very effective for:

- i) Pneumonia
- ii) Bronchitis
- iii) Sore throat



Penicillin

Six natural penicillins are isolated till now. They are got by substituting various groups for R.

Name	Substituent (R)
Penicillin G or Benzyl penicillin	R is 
Penicillin P	R is $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}-\text{CH}_2-$
Penicillin K	R is $\text{CH}_3-(\text{CH}_2)_6-$
Ampicillin	R is 

Ampicillin though quite effective, can cause allergy in certain patients.

ii) Artificial Sweetening Agents

Introduction to artificial sweetening agents

Sweetening agents are the substances that are used to sweeten food items, medications, beverages, etc. The natural sweetening agents are the ones which occur in nature as such like sugar, honey, etc. Artificial sweetening agents are the sweetening agents which does not occur as such in products and artificially added to the products to get sweetness e.g. saccharin, Sugar alcohols (sorbitol and mannitol), Acesulfame K, Aspartame, Cyclamate or other synthetic non-caloric sweeteners. They are also referred as Sugar Substitute or Artificial Sweeteners. Non-caloric sweeteners do not add any extra calories to the products when compared to the natural sweetener which add calories to the products. So, artificial sweetening agents like non-caloric sweeteners are widely used as sweetener by diabetic patients.

Commonly Used Artificial Sweetening Agents

Most commonly used artificial sweetening agents are Acesulfame K, Aspartame, Cyclamate, and Saccharin

Acesulfame K - It is one of the zero calorie artificial sweetening agents, which about 130- 200 times sweet than sucrose. Acesulfame K is not metabolized in the body.

Aspartame: It is a low calorie artificial sweetening agents about 200% sweeter than the sugar. Cyclamate: This is a calorie free artificial sweetening agents which is about 30-50 times sweet than sugar and metabolized in the gut.

Saccharin - It is one of the oldest low calorie artificial sweetening agents which is about 300-500 times more sweeter than sugar. It is not metabolizes and is absorbed very slowly. Saccharin is the most widely used artificial sweetening agents.

SHORT ANSWER QUESTIONS

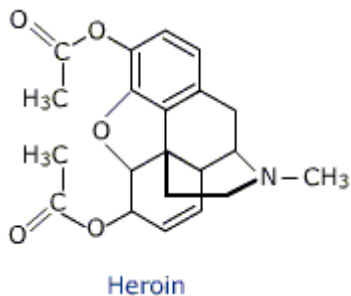
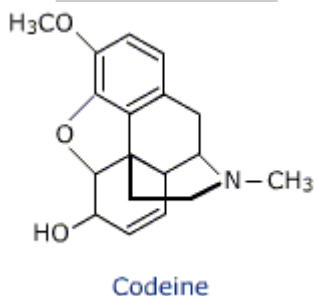
1. Explain narcotic drugs.

Narcotic drugs: These are most potent and clinically useful agents causing depression of central nervous system.

Ex: Morphine, Codeine, Heroin.. etc.

Narcotics

These analgesics are mainly opium and its products. Some examples are morphine, codeine and heroin. They are effective analgesics but cause addiction. Over dosage can cause sleep and unconsciousness.



Uses of narcotic drugs:

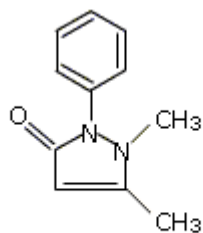
- Relief of postoperative pain
- Relief from Cardiac pain

- Relief of cancer pain
- Relief from child birth

2. Explain non- narcotic drugs.

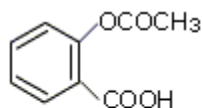
Non-narcotics

Drugs belonging to this group also have antipyretic properties (decrease body temperature). Aspirin and analgin are common drugs in this category.



Analgin

(2, 3-dimethyl-1-phenyl-3-pyrazonolin-5-one)



Aspirin

(Acetyl salicylic acid)

3. Explain Analgesics.

Analgesics:

Analgesics classes reduce or decrease the pain without causing injury of consciousness, psychological confusion, in coordination or some other disturbances of nervous system.

The types of analgesics are,

- Non-narcotic (non-addictive) analgesics
- Narcotic drugs

Non-narcotic analgesics:

Aspirin and paracetamol is under the classes of non-narcotic analgesics. Common example for non-narcotic analgesics is aspirin. Aspirin slow down the production of chemicals known as prostaglandins. Prostaglandins produce irritation in the tissue and cause pain. Aspirin secure humans from the heart attack.

Narcotic drugs:

Uses of narcotic drugs:

- Relief of postoperative pain
- Relief from Cardiac pain
- Relief of cancer pain
- Relief from child birth

4. Explain antiseptics.

Antiseptic

Antiseptics are made to be used for reducing or preventing growth of microorganisms on the skin without damaging these tissues. Antiseptic solutions should not be used to disinfect inanimate objects as they are not powerful enough to disinfect them.

Antiseptics are for use on people. In medicine, antiseptic is applied on skin, and in cervical or vaginal preparation before a clinical procedure. Antiseptic is used as a handwash in high-risk situations, like before an invasive procedure or when a contact with a patient has high risk of infection example a new-born.

A preservative is an antiseptic agent which prevents fermentation, putrefaction carried out by microbes in organic material, such as food, medicines, etc.

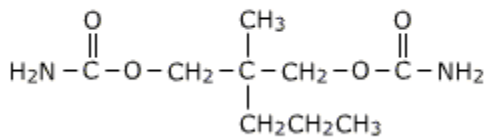
5. What are tranquilizers, sedatives and hypnotics? Explain with examples.

i) Tranquilizers:

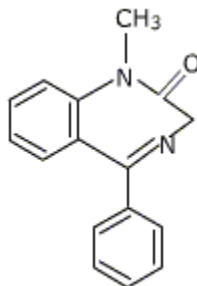
A tranquilizer is one of the classes of chemical mixture. Tranquilizers are used in the treatment of stress and mild or severe mental diseases. Different types of tranquilizer are available under the therapeutic action. The function of tranquilizer is different from one another

ii) Sedatives

Sedatives are used for mentally agitated or violent patients. Equanil (chemical name - meprobamate) and calmose (diazepam) are a couple of common drugs in this category.



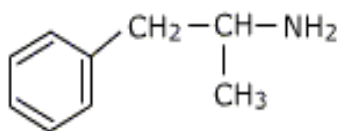
Equanil



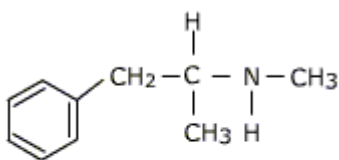
Calmpose (Diazepam)

Antidepressants or Mood Elevators or Pep Pills

Antidepressants are useful for patients who are highly depressed or have lost self-confidence. These drugs produce a feeling of well-being and improve efficiency. Tofranil, vitalin, amphetamines and cocaine are some examples.



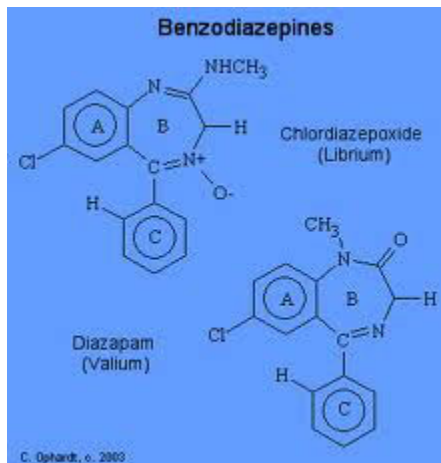
Amphetamine
(Benzedrine)



Methamphetamine
(Methadrine)

iii) Hypnotics:

Benzodiazepine is also referred as a **benzo** and it can be abbreviated as **BZD**. Benzodiazepine is a type of drug which is psychoactive in which the core chemical structure is a fusion of a diazepine ring and a benzene ring. This is the most important group and these are used as anxiolytic and hypnotic agents. These are drugs used for treating both anxiety states and insomnia.



Classification of Benzodiazepines

These are divided according to primary use.

Hypnotics:

- Diazepam
- Flurazepam
- Nitrazepam
- Flunitrazepam
- Timazepam
- Triazolam
- Midazolam

6. Explain Antiseptics and Disinfectants.

Introduction to antiseptics and disinfectants

An antiseptic is an agent that controls and prevents the growth of microorganisms. A disinfectant is a substance that destroys the microbes. Antiseptics are used on animals and human beings whereas disinfectants are used on inanimate objects like furniture, table top, kitchen floor, bathroom floor etc.

Antiseptic

Antiseptics are made to be used for reducing or preventing growth of microorganisms on the skin without damaging these tissues. Antiseptic solutions should not be used to disinfect inanimate objects as they are not powerful enough to disinfect them.

Antiseptics are for use on people. In medicine, antiseptic is applied on skin, and in cervical or vaginal preparation before a clinical procedure. Antiseptic is used as a handwash in high-risk situations, like before an invasive procedure or when a contact with a patient has high risk of infection example a new-born.

A preservative is an antiseptic agent which prevents fermentation, putrefaction carried out by microbes in organic material, such as food, medicines, etc.

Disinfectant

A disinfectant is an agent with the power to destroy microbial life. It is a germicide.

Disinfectants are for use on objects and surfaces. Disinfectants are used for domestic or hospital use like disinfecting the floors, bathrooms, washbasins etc. Disinfectants are not very effective in form of alkaline solutions or when they are combined with oxidising substances.

In medicine disinfectants are used to disinfect items such as pickup forceps, scalpel blades, scissors, and suture needles.

Disinfectants are very toxic and should not be used as an antiseptic on human beings. If disinfectants are ingested they may cause nausea, corrosion, sweating, pain, vomiting, depression, diarrhoea, respiratory and circulatory failure, myocardial damage, pulmonary edema and liver and kidney dysfunction.

Dettol is a substance used as both antiseptic as well as disinfectant.

Conclusion on Antiseptics and Disinfectants

Antiseptics and disinfectants should not be interchanged. Using either antiseptic or disinfectant in excessive quantities is also harmful. Inhaling excessive quantities of disinfectant can cause lung damage. The ideal antiseptic or disinfectant is the one that can be used on the human body and that gives maximum benefit by reducing the microorganisms and does not affect the body tissues.

7. Explain anti-microbials.

An antimicrobial drug is used to prevent the human and animals from the action of micro organism.

Examples for antimicrobial drugs:

- Antibiotics
- Antiseptics
- Disinfectants

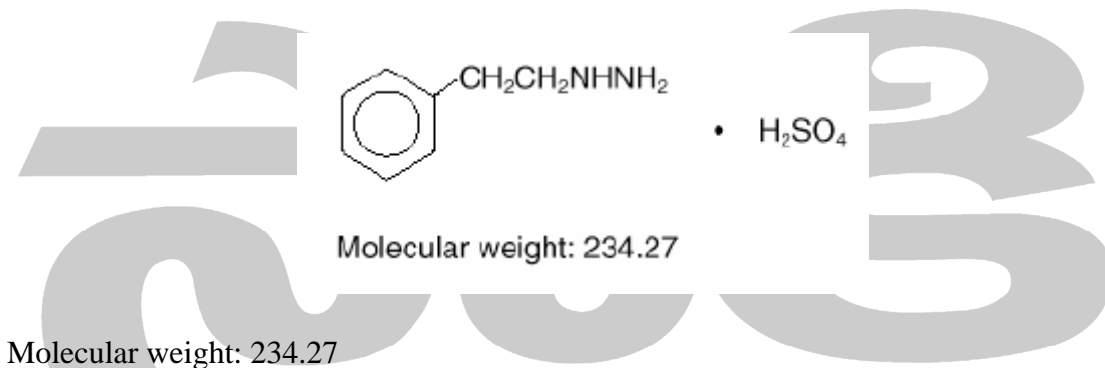
8. Explain the action of i) Ibuprofen ii) Luminal iii) Phenelzine iv) Norethindrone.

i) Ibuprofen: Ibuprofen is a well-known drug that is used to treat the symptoms of rheumatism and arthritis. Such illnesses are very disabling, and the sufferers rarely die and rarely get better.

ii) Luminal: Luminal is used for the short-term treatment of sleeplessness, the relief of anxiety, tension, and fear, and the treatment of certain types of seizures, especially in emergency situations. It may also be used for other conditions as determined by your doctor.

Luminal is a barbiturate. It works by depressing the central nervous system. This aids you in relaxing and going to sleep.

iii) Phenelzine : Phenelzine is a potent inhibitor of monoamine oxidase (MAO). Phenelzine sulfate is a hydrazine derivative. It has a molecular weight of 234.27 and is chemically described as $C_8 H_{12} N_2 \cdot H_2SO_4$. Its chemical structure is shown below:



iv) Norethindrone: Norethindrone is a form of progesterone, a female hormone. Norethindrone prevents ovulation (the release of an egg from an ovary). This medication also causes changes in your cervical mucus and uterine lining, making it harder for sperm to reach the uterus and harder for a fertilized egg to attach to the uterus.

Norethindrone is used for birth control (contraception) to prevent pregnancy. Norethindrone is also used to treat menstrual disorders, endometriosis, or abnormal vaginal bleeding caused by a hormone imbalance.

Norethindrone may also be used for other purposes not listed in this medication guide.

8. Explain food preservatives.

Ans: Chemical Preservatives: Chemicals added to food materials to prevent the growth of micro organisms or prevent spoilage and to increase their shelf life are called preservatives. Some examples are given below:

- Sodium benzoate is used as a preservative for fruits, fruit juices, jams and squashes. 0.06% to 0.1% (concentration) of sodium benzoate is added. It is easily soluble in water and therefore readily mixes with the food product.
- Potassium metabisulphite or sodium metabisulphite can also be used as preservative for fruits like apples, liches and raw mango preparations besides fruit juices. However, these chemicals cannot be used for preserving colored food materials as sulphur dioxide, one of their products, behaves as a bleaching agent with acids. Sulphur dioxide is a very good chemical to kill the harmful micro organisms in food.
- Vinegar (acetic acid) is usually used as a preservative in pickles.

9. Explain artificial sweetening agents.

Introduction to artificial sweetening agents

Sweetening agents are the substances that are used to sweeten food items, medications, beverages, etc. The natural sweetening agents are the ones which occur in nature as such like sugar, honey, etc. Artificial sweetening agents are the sweetening agents which does not occur as such in products and artificially added to the products to get sweetness e.g. saccharin, Sugar alcohols (sorbitol and mannitol), Acesulfame K, Aspartame, Cyclamate or other synthetic non-caloric sweeteners. They are also referred as Sugar Substitute or Artificial Sweeteners. Non-caloric sweeteners do not add any extra calories to the products when compared to the natural sweetener which add calories to the products. So, artificial sweetening agents like non-caloric sweeteners are widely used as sweetener by diabetic patients.

Commonly Used Artificial Sweetening Agents

Most commonly used artificial sweetening agents are Acesulfame K, Aspartame, Cyclamate, and Saccharin

Acesulfame K - It is one of the zero calorie artificial sweetening agents, which about 130-200 times sweet than sucrose. Acesulfame K is not metabolized in the body.

Aspartame: It is a low calorie artificial sweetening agents about 200% sweeter than the sugar. **Cyclamate**: This is a calorie free artificial sweetening agents which is about 30-50 times sweet than sugar and metabolized in the gut.

Saccharin - It is one of the oldest low calorie artificial sweetening agents which is about 300-500 times more sweet than sugar. It is not metabolizes and is absorbed very slowly. Saccharin is the most widely used artificial sweetening agents.

VERY SHORT ANSWER QUESTIONS

1. Define drug and give two examples.

Ans: The chemicals of low molecular masses ranging from 100 to 900 U that react with macromolecular targets are called drugs.

Ex: Morphine, Codeine, Heroin ..etc.

2. Define medicine. Give two examples.

Ans: The drug that produce biological response therapeutically and that are useful in diagnosis, prevention and treatment of disease are known as medicine.

Ex: Aspirin, Ibuprofen etc.

3. How do you differentiate between drug and medicine?

Ans: Drugs react with macromolecular targets and produce a biological response whereas medicines produce therapeutically biological response and also useful in diagnosis, prevention and treatment of disease.

4. What are narcotic drugs? Give an example.

Ans: Alkaloids like morphine, codeine are called narcotic drugs. They cause the depression of central nervous system and at the same time they are strong analgesics. These are addictive drugs.

5. What are non-narcotic drugs? Give an example.

Ans: Aspirin and paracetamol is under the classes of non-narcotic analgesics. Common example for non-narcotic analgesics is aspirin. Aspirin slow down the production of chemicals known as prostaglandins. Prostaglandins produce irritation in the tissue and cause pain. Aspirin secure humans from the heart attack.

6. What are analgesics? Give two examples each.

Ans: Analgesics classes reduce or decrease the pain without causing injury of consciousness, psychological confusion, in coordination or some other disturbances of nervous system.

The types of analgesics are,

- Non-narcotic (non-addictive) analgesics
- Narcotic drugs

Ex: Aspirin and Ibuprofen

7. Define antipyretics.. Give two examples.

Ans: The drugs used for control of fever are called antipyretics.

Ex: Paracetmol, Phenacetin and analgin etc.

8. Define tranquilizers. Give two examples.

Ans: Tranquilizers:

A tranquilizer is one of the classes of chemical mixture. Tranquilizers are used in the treatment of stress and mild or severe mental diseases. Different types of tranquilizer are available under the therapeutic action. The function of tranquilizer is different from one another

Ex: Lumial, Seconal and Barbituric acid.

9. Define antiseptics and give example.

Ans: An antiseptic is an agent that controls and prevents the growth of microorganisms. Antiseptics are used on animals and human beings.

Ex: Dettol, Bithionol, Tincture of iodine.

10. What are disinfectants?

Ans: A disinfectant is an agent with the power to destroy microbial life. It is a germicide.

Disinfectants are for use on objects and surfaces. Disinfectants are used for domestic or hospital use like disinfecting the floors, bathrooms, washbasins etc. Disinfectants are not very effective in form of alkaline solutions or when they are combined with oxidising substances.

Ex: 4 % solution of formalin

11. What are anti fertility drugs? Give example.

Ans: The chemical substance, which affect human metabolism and provides cure from aliment is known as the anti fertility drugs.

Ex: Norethifrone, Ethynylstrodiol and Mifepristone

12. Define antibiotics and give examples.

Ans: Antibiotics are chemical substances produced by microorganisms that inhibit the growth or destroy microorganisms.

Ex: Pencillin, chloramphenicol etc.

13. What are antacids? Give examples.

Ans: Antacids: Chemicals that remove the excess acid in the stomach and maintain the PH to normal level are antacids.

Ex: Omeprazole, Lansoprazole etc.

14. Define antihistamines. Give examples.

Ans Antihistamines prevent the interaction of histamine with receptors of the stomach wall thus producing less amount of acid.

Ex: Dimetane (Dimetap), Saradane etc.

15. What difference do you find between antacid and antihistamine?

Ans: Antacids directly remove the excess acid in the stomach whereas antihistamine lowers acid content in the stomach indirectly by preventing the interaction of histamine with receptors of the stomach wall.

16. What are food preservatives? Give examples.

Ans: Food preservatives: Chemicals which are used to enhance the appeal preservation of the food are called food preservatives.

Ex: Sodium Benzoate, salts of Propionic and sorbic acids etc.

Anti oxidants are more reactive towards oxygen and retard the action of oxygen so preserve the food.

Ex: BHT, BHA, SO₂ etc.

17. Why the synthetic food colours are not advisable?

Ans: Edible colours used for food are dyes generally. Food dyes have no nutritive value but sometimes are harmful particularly for children asthma patients etc. "Tetrazine" is one such highly used suspect.

18. What are artificial sweetening agents? Give examples.

Ans: Artificial sweetening agents are chemicals used in place of sugar times sweeter to sucrose.

They decrease the calorific intake and at the same time several times sweeter to sucrose.

Examples: i) Aspartame is 100 times sweeter to sugar which is most widely used as artificial sweetener.

ii) Alitame and sucrose are some other examples.

19. What are the advantages with artificial sweetening agents?

Ans: Advantages of artificial sweetening agents:

i) Its use has great value in controlling calories and it is also useful for diabetic persons.

ii) They excreted through urine easily.

iii) Control of sweetness of food is difficult. Sucrose (an artificial sweetening agent) appearance and taste are similar to sugar and it has no calorie addition. It is stable at cooking temperature.