12^{TH} STD CHEMISTRY

Applications and Uses

1. Application of Al

1.Many heat exchangers/sinks and our day to day cooking vessels are made of aluminium.

2.It is used as wraps (aluminium foils) and is used in packing materials for food items,

3.Aluminium alloys with copper, manganese, magnesium and silicon are used in design of aeroplanes and other forms of transport.

4. It is used in the design of chemical reactors, medical equipments,refrigeration units and gas pipelines.

5. It is used in electrical overhead electric cables with steel core for strength.

2. Application of Zn

1. Zinc is used in **galvanising** metals to protect them from rusting and corrosion.

2.Zinc is also used to produce die-castings in the automobile, electrical and hardware industries

3.Zinc oxide is used in the manufacture of many products such as paints, rubber, cosmetics, Zinc sulphide is used in making luminous paints, fluorescent lights and x-ray screens. 4.Brass an alloy of zinc is used in water valves and communication equipment as it is highly resistant to corrosion.

3. Application of Fe

1. Iron is one of the most useful metals and its alloys are used everywhere including bridges, electricity pylons, bicycle chains, cutting tools and rifle barrels.
2. Cast iron is used to make pipes, valves and pumps stoves etc...
3.Magnets can be made of iron and its alloys and compounds.
4.An important alloy of iron is stainless steel, and it is very resistant to corrosion. It is used in architecture, bearings, cutlery, surgical instruments and jewellery.
5. Nickel steel is used for making cables, automobiles and aeroplane parts.
6. Chrome steels are used foor manufacturing cutting tools and curshing machines.

4. Application of Cu

1. Copper is used for making coins and ornaments along with gold and other metals.
2. Copper and its alloys are used for making wires, water pipes and other electrical parts.

5. Application of Au

1.It is used for coinage, and used as standard for monetary systems in some countries.

2.It is used extensively in jewellery in its alloy form with copper.

3.Gold nanoparticles are also used for increasing the efficiency of solar cells and also used an catalysts .

6. Uses of boron:

1. Boron has the capacity to absorb neutrons. Hence, its isotope $_{10}B^5$ is used as moderator in nuclear reactors.
2. Amorphous boron is used as a rocket fuel igniter.
3. Boron is essential for the cell walls of plants.

4. Compounds of boron have many applications. For example eye drops, antiseptics, washing powders etc..

7. Uses of Borax:

1. Borax is used for the identification of coloured metal ions
2. In the manufacture optical and borosilicate glass, enamels and glazes for pottery
3. It is also used as a flux in metallurgy and also acts as a good preservative.

8. Uses of boric acid:

1. Boric acid is used in the manufacture of pottery glazes, glass, enamels and pigments.
2. It is used as an antiseptic and as an eye lotion.
3. It is also used as a food preservative.

9. Uses of diborane:

1. Diborane is used as a high energy fuel for propellant 2. It is used as a reducing agent in organic chemistry
3. It is used in welding torches.

10. Uses of Boron trifluoride:

1. Boron trifluoride is used for preparing HBF4, a catalyst in organic chemistry
2. It is also used as a fluorinating reagent.

11. Uses of aluminium chloride:

1. Anhydrous aluminium chloride is used as a catalyst in Friedels Crafts reactions
2. It is used for the manufacture of petrol by cracking the mineral oils.
3. It is used as a catalyst in the manufacture on dyes, drugs and perfumes.

12. Uses of Alum:

1. It is used for purification of water
2. It is also used for water proofing and textiles
3. It is used in dyeing, paper and leather tanning industries
4. It is employed as a styptic agent to arrest bleeding.

13. Used of carbon monoxide:

1. Equimolar mixture of hydrogen and carbon monoxide - water gas and the mixture of carbon monoxide and nitrogen - producer gas are important industrial fuels
2. Carbon monoxide is a good reducing agent and can reduce many metal oxides to metals.
3. Carbon monoixde is an important ligand and forms carbonyl compound with transition metals.

14. Uses of carbon dioxide:

1. Carbon dioxide is used to produce an inert atomosphere for chemical processing.
2. Biologically, it is important for photosynthesis.
3. It is also used as fire extinguisher and as a propellent gas.
4. It is used in the production of carbonated beverages and in the production of foam.

15. Uses Of Silicones:

1. Silicones are used for low temperature lubrication and in vacuum pumps, high temperature oil baths etc...
2. They are used for making water proofing clothes
3. They are used as insulting material in electrical motor and other appliances

4. They are mixed with paints and enamels to make them resistant towards high temperature, sunlight, dampness and chemicals.

16. Uses of nitrogen:

1. Nitrogen is used for the manufacture of ammonia, nitric acid and calcium cyanamide etc.
2. Liquid nitrogen is used for producing low temperature required in cryosurgery, and so in biological preservation .

17. Uses of nitric acid: S.JOSEPH SURESH, MSc,.M.Ed, 9994342531

1. Nitric acid is used as a oxidising agent and in the preparation of aquaregia.
2. Salts of nitric acid are used in photography ($AgNO_3$) and gunpowder for firearms. ($NaNO_3$)

18. Uses of phosphine: (Holmes signal)

Phosphine is used for producing smoke screen as it gives large smoke. In a ship, a pierced container with a mixture of **calcium carbide** and **calcium phosphide,** liberates **phosphine** and **acetylene** when thrown into sea. The liberated phosphine catches fire and ignites acetylene. These burning gases serves as a signal to the approaching ships. This is known as **Holmes signal**.

19. Uses of Oxygen:

1. Oxygen is one of the essential component for the survival of living organisms.
2. It is used in welding (oxyacetylene welding) 3. Liquid oxygen is used as fuel in rockets etc...

20. Uses SO_2:

1. Sulphur dioxide is used in bleaching hair, silk, wool etc...
2. It can be used for disinfecting crops and plants in ag

21.Uses of sulphuric acid:

1. Sulphuric acid is used in the manufacture of fertilisers, ammonium sulphate and super phosphates and other chemicals such as hydrochloric acid, nitric acid etc...
2. It is used as a drying agent and also used in the preparation of pigments, explosives etc..

22. Uses of chlorine:

1. Purification of drinking water
2. Bleaching of cotton textiles, paper and rayon
3. It is used in extraction of gold and platinum

23. Uses of hydrochloric acid:

1. Hydrochloric acid is used for the manufacture of chlorine, ammonium chloride, glucose from corn starch etc.,
2. Extraction of glue from bone and for purification of bone black.

24. Helium:

1. Helium and oxygen mixture is used by divers in place of air oxygen mixture.
2. Helium is used to provide inert atmosphere in electric arc welding of metals
3. Helium has lowest boiling point hence used in cryogenics (low temperature science).
4. It is much less denser than air and hence used for filling air balloons

25. Neon:

1.Neon is used in advertisement as neon sign and the brilliant red glow is caused by passing electric current through neon gas under low pressure.

26. Argon:

Argon prevents the oxidation of hot filament and prolongs the life in filament bulbs.

27. Krypton:

1. Krypton is used in fluorescent bulbs, flash bulbs etc...
2. Lamps filed with krypton are used in airports as approaching lights as they can penetrate through dense fog.

28. Xenon:

1. Xenon is used in fluorescent bulbs, flash bulbs and lasers.
2. Xenon emits an intense light in discharge tubes instantly. Due to this it is used in high speed electronic flash bulbs used by photographers

29. Radon:

1. Radon is radioactive and used as a source of gamma rays
2. Radon gas is sealed as small capsules and implanted in the body to destroy malignant i.e. cancer growth

30. Uses of potassium dichromate:

1. It is used as a strong oxidizing agent.
2. It is used in dyeing and printing.
3. It used in leather tanneries for chrome tanning.
4. It is used in quantitative analysis for the estimation of iron compounds and iodides.

31. Uses of Bayer's reagent:

(Cold dilute alkaline KMnO 4 is known as Bayer's reagent.)

It is used to oxidise alkenes into diols. For example, ethylene can be converted into ethylene glycol and this reaction is used as a test for unsaturation.

32. Uses of potassium permanganate:

1. It is used as a strong oxidizing agent.
2. It is used for the treatment of various skin infections and fungal infections of the foot.
3. It used in water treatment industries to remove iron and hydrogen sulphide from well water.
4. It is used as a Bayer's reagent for detecting unsaturation in an organic compound.
5. It is used in quantitative analysis for the estimation of ferroussalts, oxalates, hydrogen peroxide and iodides.

33. Uses of methanol :

1. Methanol is used as a solvent for paints, varnishes, shellac, gums, cement, etc.
2. In the manufacture of dyes, drugs, perfumes and formaldehyde.

34. Uses of ethanol:

1. It is also used in the preparation of
    a) Paints and varnishes.
    b) Organic compounds like ether, chloroform, iodoform, etc.,
    c) Dyes, transparent soaps.
2. As a substitute for petrol under the name power alcohol used as fuel for aeroplane.
3. It is used as a preservative for biological specimens.

35. Uses of ethylene glycol:

1. Ethylene glycol is used as an antifreeze in automobile radiator
2. Its dinitrate is used as an explosive with TNG.

36.Uses of glycerol

1. Glycerol is used as a sweetening agent in confectionary and beverages.
2. It is used in the manufacture of cosmetics and transparent soaps.
3. It is used in making printing inks and stamp pad ink and lubricant for watches and clocks.
4. It is used in the manufacture of explosive like dynamite and cordite by mixing it with china clay.

37. Uses of phenol

1) About half of world production of phenol is used for making phenol formaldehyde resin. (Bakelite).
2) Phenol is a starting material for the preparation of
   i) drugs such as phenacetin, Salol, aspirin, etc.
   ii) phenolphthalein indicator. iii) explosive like picric acid.
3) It is used as an antiseptic-carbolic lotion and carbolic soaps.

38. Uses of Diethyl ether

1) Diethyl ether is used as a surgical anaesthetic agent in surgery.
2) It is a good solvent for organic reactions and extraction.
3) It is used as a volatile starting fluid for diesel and gasoline engine.
4) It is used as a refrigerant.

39. Uses of anisole

1) Anisole is a precursor to the synthesis of perfumes and insecticide pheromones,
2) It is used as a pharmaceutical agent .

40. Uses of Urotropine

(i) Urotropine is used as a medicine to treat urinary infection.
(ii) Nitration of Urotropine under controlled condition gives an explosive RDX (Research and development explosive). It is also called cyclonite or cyclotri methylene trinitramine.

41. Formaldehyde

(i) 40% aqueous solution of formaldehyde is called **formalin**. It is used for preserving biological specimens.
(ii) Formalin has hardening effect, hence it is used for tanning.
(iii)Formalin is used in the production of thermo setting plastic known as bakelite, which is obtained by heating phenol with formalin.

42. Acetaldehye

1) Acetaldehyde is used for silvering of mirrors 2. Paraldehyde is used in medicine as a hypnotic.
3. Acetaldehyde is used in the commercial preparation of number of organic compounds like acetic acid, ethyl acetate etc.,

43. Acetone

1) Acetone is used as a solvent, in the manufacture of smokeless powder (cordite)
2) It is used as a nail polish remover
3) It is used in the preparation of sulphonal, a hypnotic.
4) It is used in the manufacture of thermosoftening plastic **Perspex.**

44. Benzaldehyde is used

1) as a flavoring agent
2) in perfumes
3) in dye intermediates
4) as starting material for the synthesis of several other organic compounds like cinnamaldehyde, cinnamic acid, benzoyl chloride etc.

45. Aromatic Ketones

1) Acetophenone has been used in perfumery and as a hypnotic under the name **hypnone.**
2) Benzophenone is used in perfumery and in the preparation of **benzhydrol drop.**

46. Formic acid `

1) Used for the dehydration of hides.
2) Used as a coagulating agent for rubber latex
3) Used in medicine for treatment of gout
4) Used as an antiseptic in the preservation of fruit juice.

47. Acetic acid

1. Uesd as table vinegar.
2. Used for coagulating rubber latex.
3. Used for manufacture of cellulose acetate and poly vinylacetate.

48. **Benzoic acid**

1. Used as food preservative either in the pure form or in the form of sodium benzoate in medicine as an urinary antiseptic.
2. Used for manufacture of dyes.

49. **Acetyl Chloride**

1. Used as acetylating agent in organic synthesis.
2. Used in detection and estimation of – OH, - NH2 groups in organic compounds.

50. **Acetic anhydride**

1. Used acetylating agent
2. Used in the preparation of medicine like asprin and phenacetin
3. Used for the manufacture plastics like cellulose acetate and poly vinyl acetate .

51. **Ethyl acetate**

1. Used in the preparation of artificial fruit essences
2. Used as a solvent for lacquers
3. Used in the preparation of organic synthetic reagent like ethyl acetoacetate.

52. **Nitroalkanes**

1. Nitromethane is used as a fuel for cars
2. Chloropicrin (CCl3 2 NO)is used as an insecticide

3. Nitroethane is used as a fuel additive and precursor to explosive and they are good solvents for polymers, cellulose ester, synthetic rubber and dyes etc.,
4. 4% solution of ethylnitrite in alcohol is known as sweet spirit of nitre and is used as diuretic.

53. **Nitrobenzene**

1. Nitrobenzene is used to produce lubricating oils in motors and machinery.
2. It is used in the manufacture of dyes, drugs, pesticides, synthetic rubber, aniline and explosives like TNT, TNB.

54. **Cyanides and Isocyanides**

1. Alkyl cyanides are important intermediates in the organic synthesis of larger number of compounds like acids, amides, esters, amines etc.
2. Nitriles are used in textile industry in the manufacture of nitrile rubber and also as a solvent particularly in perfume industry.

55. **Tranquilizers**

Treatment of stress, anxiety, depression, sleep disorders and severe mental diseases like schizophrenia

Analgesics (Non –narcotic)

Used for short-term pain relief and for modest painlike headache, muscle strain, bruising, or arthritis.

Antipyretics

Reducing fever (antipyretic) and preventing platelet coagulation.

Opioids (Narcotic Analgesics) [Morphine, codeine]

Used for either short term or long-term relief of severe pain. Mainly used for post operative pain, pain of terminal cancer.

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It causes loss of sensation.

Antacids

To relieve symptoms such as burning sensation in the chest/ throat area (heart burns) caused by acid reflux.

Antihistamines

To provide relief from the allergic effects.

Antimicrobials

1. Beta-Lactams (Penicillins, ampicillin, cephalosporins, carbapenems, and monobactams)

To treat skin infections, dental infections, ear infections, respiratory tract infections, pneumonia, urinary tract infections, and gonorrhoea.

2. Macrolides (Erythromycin, azithromycin)

To treat respiratory tract infections, genital, gastrointestinal tractand skin infections.

3.Fluoroquinolones (Clinafloxacin, ciprofloxacin, levofloxacin)

To treat urinary tract infections, skin infections, and respiratory infections (such as sinusitis, pneumonia, bronchitis), pulmonary infections in cystic fibrosis.

4. Tetracyclines (Doxycycline, minocycline, oxytetracycline)

Used in the treatment of peptic ulcer disease, infections of the respiratory tract, cholera, acne vulgaris.

5.Aminoglycosides (Kanamycin, gentamicin, neomycin)

Used to treat infections caused by gram-negative bacteria.

6. Antiseptics (Hydrogen peroxide, povidone-iodine, benzalkonium chloride)

To reduce the risk of infection during surgery and other procedures

7. Disinfectants (Chlorine compounds, alcohol, Hydrogen peroxide)

Stop or slow down the growth of microorganisms – Generally used on inanimate objects.

Antifertility drugs (Synthetic oestrogen,Synthetic Progesterone)

Used in birth control pills.

Nylon – 6,6

It is used in textiles, manufacture of cards etc…

Nylon – 6

It is used in the manufacture of tyrecards fabrics etc….

Bakelite

1. Navolac is used in paints. Soft backelites are used for making glue for binding laminated
2. Wooden planks and in varinishes, Hard backelites are used to prepare combs, pens etc..

Melamine (Formaldehyde melamine): It is

used for making unbreakable crockery

Neoprene:

It is used in the manufacture of chemical containers, conveyer belts.

Buna-N:

It is used in the manufacture of hoses and tanklinings.

PHBV

It is used in ortho paedic devices, and in controlled release of drugs.