

# Chemistry – Miscellaneous

These notes are your ultimate revision weapon to revise Chemistry – Miscellaneous. We've distilled years of previous exam questions (PYQs) into one powerful, concise resource. Everything you need to know, nothing you don't.

- **PYQs, Decoded:** All key concepts from past exams, organized and simplified.
- **Revise in Record Time:** Short, precise, and designed for last-minute review.
- **Focus on What Matters:** Master high-probability topics and boost your confidence.

## Scientific Awards & Recognitions

- **Nobel Prize in Chemistry 2019**
  - Awarded for the development of **lithium-ion batteries**.

## Chemistry & Properties of Materials

- **Types of Glass**
  - **Crookes glass:** A type of glass that can cut off ultraviolet rays.
- **Fireproofing Agents**
  - **Aluminium Sulphate:** A compound used to make fireproof clothing.
- **Synthetic Materials**
  - **Kevlar:** A synthetic fiber.
  - **Carbon Fibre:** Used in aircraft manufacturing.
  - **Neoprene:** A type of synthetic rubber.
- **Nanotechnology**
  - **Carbon Nanotubes (CNTs):** First prepared by scientist **Iijima**.

## Environmental Chemistry

- **Ozone Layer Depletion**
  - The ozone layer is destroyed by **Chlorofluorocarbons (CFCs)**.
  - **Dichlorodifluoromethane** is a type of CFC used in refrigerators.
- **Ozone Properties**
  - Kills microorganisms in water.
  - It is **not radioactive**.
- **Global Warming & Greenhouse Gases**
  - Relative contribution to global warming: **Carbon dioxide (CO<sub>2</sub>) > Methane (CH<sub>4</sub>) > Nitrous Oxide (N<sub>2</sub>O) > CFCs**.
  - **Carbon Dioxide (CO<sub>2</sub>)**: A primary greenhouse gas.
  - **One carbon credit** is equivalent to **1000 kg of CO<sub>2</sub>**.
  - **Geoengineering Techniques** suggested to reduce global warming:
    - Cirrus cloud thinning technique.
    - Injection of sulphate aerosol into the stratosphere.
- **Artificial Rain & Weather Modification**
  - **Silver Iodide** is used for making artificial clouds and inducing artificial rain.
  - The amount of rain depends on **humidity in the atmosphere**.

## Safety & Hazard Control

- **Fire Extinguishers**
  - **Carbon dioxide (CO<sub>2</sub>)** is the commonly used gas.
  - In ordinary fire extinguishers, CO<sub>2</sub> is generated by the reaction of **sodium bicarbonate and dilute sulphuric acid**.
  - **Carbon Tetrachloride** was historically used in fire extinguishers.
- **Fire Alarms**
  - A **photocell** is a device used in fire alarms.
- **Poisons & Rodenticides**
  - **Rodenticide**: A chemical used to control rodents.

- **Zinc Phosphide:** Used as rat poison.
- **Potassium Cyanide:** Used for making rat poison.
- **Aluminium Phosphide:** Used as a fumigant and rodenticide.

## Pesticides and Repellents

- **Mosquito Repellents**
  - Active chemicals: **Allethrin, Prallethrin, Pyrethrum.**
  - **Pyrethrin** (used in mosquito coils) is obtained from a seed plant (e.g., Chrysanthemum).
  - **Lemongrass** is a natural plant used in repellents.
- **Agricultural Pesticides & Insecticides**
  - Chemicals viewed with apprehension due to toxicity: **carbofuran, methyl parathion, phorate, triazophos.**
  - **Pyrethrum** and **Rotenone** are used as insecticides.
  - **Benzene hexachloride (BHC)** is an insecticide.
- **Herbicides & Weedicides**
  - **Herbicide:** A chemical used to kill unwanted plants (weeds).
  - **Sodium chlorate:** A herbicide.
  - **2,4-D (2,4-Dichlorophenoxyacetic acid):** Common weedicide for paddy fields.
  - **Agent Orange:** A herbicide/defoliant used in the Vietnam War, containing the harmful substance **Dioxin**, which caused cancers, miscarriages, and birth defects.
- **Fungicides**
  - **Blue Vitriol (Copper Sulfate)** is used as a fungicide.

## Radioactive Dating & Isotopes

- **Carbon Dating**
  - **Carbon-14 (C-14 or  ${}^6\text{C}^{14}$ )** is used for radioactive dating of archaeological samples like **firewood, bone, and shell** to determine the age of fossils.

- **Other Dating Methods**
  - The age of the **Earth and rocks** is measured using the **Uranium-238 dating process**.
  - **Radioactive dating** is a technique to measure the age of rocks.
- **Government Organizations**
  - **BRIT (Board of Radiation and Isotope Technology)** in India is engaged with Isotope Technology.

## Chemicals and Their Uses

- **Metals and Applications**
  - **Iron**: Key component of Haemoglobin.
  - **Copper**: Used in lightning conductors.
  - **Lead**: Used in storage batteries. Can be an unwanted chemical in lipstick.
  - **Silver**: Used in photography (Silver bromide).
  - **Zinc**: Used for galvanization (protecting iron from rusting). Its oxide is known as **Philosopher's wool**.
  - **Titanium**: Known as the 'metal of the future'.
  - **Mercury**: Its sulphide (Mercuric Sulphide) is Vermillion.
  - **German Silver**: An alloy (contains no silver).
  - **Uranium**: Used in atom bombs.
  - **Tetraethyl lead**: Used as an anti-knocking agent in petrol.
- **Non-Metals and Compounds**
  - **Silver Bromide**: Used in photography.
  - **Lithium Salts**: Lithium bicarbonate treats rheumatism.
  - **Magnesium Hydroxide (Milk of Magnesia)**: Used as an antacid.
  - **Sodium Chromate**: Supplies a red colour.
  - **Hydrochloric Acid**: Used in lead-acid accumulator cells.
  - **Nitrocellulose**: An explosive.
  - **Taxol**: An anticancer drug.
  - **Eosin**: A dye used in making red ink.
  - **Freon**: Used as a refrigerant.
  - **Aspartame**: An artificial sweetener.

- **Benadryl**: An anti-histamine drug.
- **Morphine**: Used as an analgesic (painkiller).
- **Potassium Compounds**:
  - **Potassium bromide**: Used in photography.
  - **Potassium nitrate**: Used in gunpowder and as a fertilizer.
  - **Potassium sulphate**: Used as a fertilizer.
  - **Monopotassium tartrate**: Used in baking powder.
- **Phosphorus**:
  - **Red Phosphorus**: Used for manufacturing safety matches.
  - **White Phosphorus**: Glows spontaneously in air and darkness (chemiluminescence).
- **Silicon Carbide**: Used for making artificial diamonds.
- **Household & Medical Products**
  - **Acetone**: Used as a nail polish remover.
  - **Hydrogen Peroxide**: Used as an antiseptic for wounds.
  - **Liquid Ammonia**: Used as a refrigerant.
  - **Boric Acid**: Used as an antiseptic.
  - **Phenyl**: A household germicide (phenol derivative).
  - **Dry Washing**: Can be done using **Petrol, Benzene, or Alcohol**.

## Batteries & Electrolytes

- **Dry Cells**
  - Electrolytes: **Ammonium Chloride** (primary) and **Zinc Chloride**.
  - The reaction is **not reversible**, so it cannot be recharged.
  - Energy conversion: **Chemical energy to electrical energy**.
- **Car Batteries (Lead-Acid)**
  - Electrolyte: **Sulphuric Acid**.
  - Electrodes: **Lead peroxide and Lead**.
- **Rechargeable Batteries**
  - **Nickel and Cadmium** serve as electrodes in batteries for devices like torches and electric shavers.

## Soil Science

- **Soil Reclamation**
  - **Calcium Sulphate (Gypsum)** acts as a reclamation agent for alkaline soil.
- **Terminology**
  - **Edaphic:** A term relating to or concerning soil.

## Chemical Warfare

- **Chemical Weapons**
  - **Mustard gas** and **Phosgene** were used in WWI.
  - **Mustard gas** is a liquid at room temperature.
- **Smoke Screens**
  - Consist of fine particles of **Titanium Oxide** dispersed in air.
- **Conventions**
  - The **Hague Convention** deals with biological and chemical weapons.



## Atmospheric Science & Pollution

- **Air Pollution**
  - **Pollutants:**
    - **Carbon Monoxide (CO)** and **Sulphur Dioxide (SO<sub>2</sub>)**: Main pollutants in metropolitan cities. Produced by incomplete burning of petrol/diesel.
    - **Oxides of Nitrogen and Sulphur:** Cause smog.
    - **Hydrogen Sulphide:** An inorganic gaseous pollutant from decaying vegetation/animal matter.
    - **Mercury:** Toxic pollutant from pesticides, dental amalgam, fluorescent lamps, and coal power plants.
    - **Magnetic particles:** From vehicle brakes/engines and power plants, suspected to cause neurodegenerative problems.
    - **Sulphur Dioxide:** Causes acid rain.

- **Fluoride pollution:** Not related to the Bhopal gas tragedy (which was caused by Methyl isocyanate).
  - **Particulate Matter (PM):**
    - An air pollutant and solid residue.
    - **Respirable Suspended Particulate Matter (RSPM):** Particles sized **less than 5 micrometers ( $\mu\text{m}$ )**.
  - **Government Monitoring (India's NAMP) monitors:**
    - Sulphur Dioxide ( $\text{SO}_2$ )
    - Nitrogen Dioxide ( $\text{NO}_2$ )
    - Suspended Particulate Matter (PM10)
    - Fine Particulate Matter (PM2.5)
- **Noise Pollution**
  - Measured in **Decibels (dB)**.
  - '**Green Mover**' is a term used in combating noise pollution.
- **Other Effects**
  - **Ultraviolet (UV) Light:** Causes skin cancer (linked to ozone depletion).
  - Harnessing nuclear energy often causes **thermal pollution**.

## Water Pollution & Technology

- **Eutrophication**
  - Nutrient enrichment of a water body from high amounts of **nitrogenous nutrients and orthophosphates**.
  - Leads to **enhanced growth of algae (algal blooms)**.
  - Depletes **dissolved oxygen** in the water.
- **Measurement**
  - **Biological Oxygen Demand (BOD):** A standard criterion for pollution assay in aquatic ecosystems.
- **Causes**
  - Physico-chemical characteristics of water sources change due to **effluents**.

- **Water Technology**
  - **Desalination in India:** The first plant based on low-temperature thermal desalination was commissioned in **Kavaratti, Lakshadweep**.

## Topic 13: Waste Management

- **Waste-to-Energy Technologies**
  - Processes include '**pyrolysis**' and '**plasma gasification**'.

## Food & Consumer Products

- **Contaminants**
  - **Brominated vegetable oils** are found in some soft drinks.
  - **Monosodium glutamate (MSG)** is common in Chinese fast food.

## Physics & Technology



- **Electronics**
  - A **Magnetron tube** is used in a microwave oven.
- **Scientific Terms**
  - **Cryogenics:** The technology of producing and using very low temperatures.
  - **Nuclear Fission:** The breaking apart of an atomic nucleus (Fusion is the combining of nuclei).
  - **Anti-matter:** Creation of anti-helium nucleus helps probe the possibility of anti-matter stars/galaxies and understand the evolution of the universe.
- **Inventions and Discoveries**
  - **Rutherford:** Discovered the atomic nucleus.
  - **Alfred Nobel:** Invented dynamite.
  - **Cartwright:** Invented the powerloom.
  - **Graham Bell:** Invented the telephone.



## Everyday Science

- The pungent smell near urinals is due to **Ammonia**.

## Policies, Conventions & Important Days

- **Policies**
  - **Brazil** made it mandatory to blend ethanol with gasoline.
  - The **Under2 Coalition** is an international climate change agreement.
- **Conventions**
  - **UNFCCC (United Nations Framework Convention on Climate Change)**: Deals with greenhouse gas emissions.
  - **Talanoa Dialogue**: An international dialogue on global climate change.
  - **Alma-Ata Declaration**: Related to healthcare.
- **International Years**
  - **2011** was designated by the UN as **The International Year of Chemistry**.
- **Important Days**
  - **Technology Day**: 11th May
  - **Photography Day**: 19th August
  - **National Sports Day (India)**: 29th August (Major Dhyan Chand's birthday)
  - **Nagasaki Day**: 9th August

## Correctly Matched Pairs

- Silver Iodide → Artificial Rain
- Zinc Phosphide → Rat Poison
- Blue Vitriol → Fungicide
- Eosin → Red Ink
- Kevlar → Synthetic Fiber
- Taxol → Anticancer Drug
- Nitrocellulose → Explosive

- Ozone depletion → Skin cancer

### **Know More About Chemistry – Miscellaneous Topics:**

- [Chemistry – Miscellaneous Topics – Old Year Questions](#)
- [Chemistry – Miscellaneous Topics One Liner Questions & Answers](#)

