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Where Minds Pollinate

**Class 11
Chemistry**

Chapter 13
Enviromental Chemistry -
Air
Handwritten Notes

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Day:- Monday

Date:- September, 30

CHAPTER 13

ENVIRONMENTAL CHEMISTRY

* NOTES:-

i- "Air Pollution"

Environment has 4 main parts.

- Atmosphere → air around the Earth
- Hydrosphere → water present on the Earth
- Lithosphere → lands, soil, rocks
- Biosphere → all living organism

- * definition:- presence of harm-ful substance in air -that damage the environment & human health - air pollution

COMPONENTS:-

- Atmosphere:- • Blanket of gases around the Earth.
 - protects life, block harmful rays, and balance temperature.
 - Mainly consist of Nitrogen (78%), oxygen (21%) and other gases like CO_2 / H_2O vapour or other noble gases.
- Hydrosphere:- • Include all water on Earth (ocean, river, lakes, glaciers, ground water)
 - Distributes heat and support life.
- Lithosphere:- • Solid outer layer of Earth (Land, soil, rocks)
 - Geological process like Earthquakes etc occur.

- c) Biosphere:- Includes all living organisms (plants, animals, humans, Microorganism, ecosystem)

ii-

"Smog"

Combination of Smoke and fog results into smog

- * definition:- dirty air with a hazy, often yellowish appearance that reduces visibility & harm health → Smog

TYPES:-

- a) Photochemical Smog OR Oxidizing Smog:-

- (i) Found in cities with heavy traffic.
- (ii) Forms when sunlight reacts with Nitrogen oxides (NO_x) & volatile organic compound (VOCs)
- (iii) produces ozone (O_3), peroxyacetyl nitrates & other harmful substance.

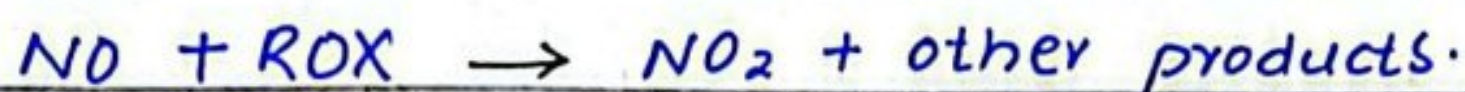
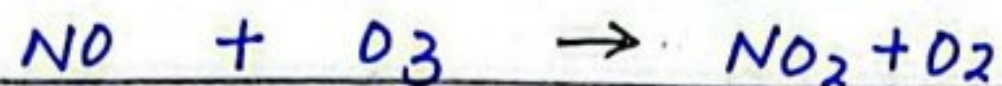
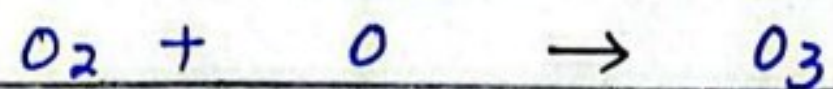
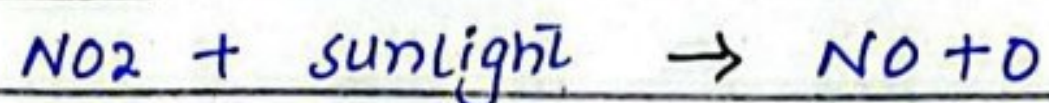
- (b) Industrial Smog OR Reducing Smog:- (black smog)

- (i) Common in areas with coal or fossil fuels burning.
- (ii) contain particulate matter (PM), sulphur dioxide (SO_2)

COMPOSITION:-

- Nitrogen Oxides (NO_x)
- Volatile Organic Compound (VOCs)
- Particulate Matter (PM)
- Ozone (O_3)
- Sulphur dioxide (SO_2)

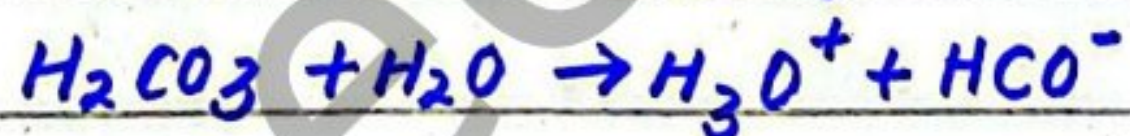
FORMATION



iii-

"ACID RAIN"

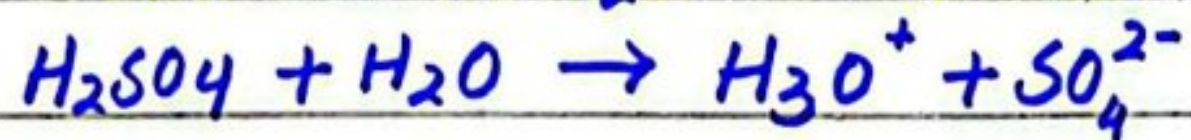
- * Defination:- • Rain with pH Level less than 5.6 due to SO_2 & NO_x in air
- SO_2 & NO_x react with water and form strong acid
- Also have a slight mixing of aerial CO_2 that forms weak carbonic bond.



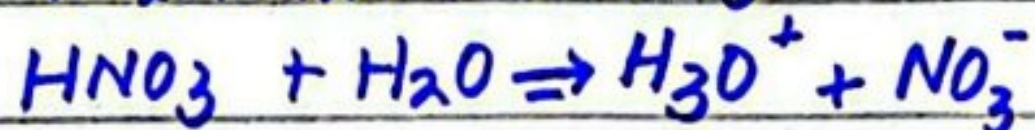
- * Reason for Acid Rain:-

- Fossil Fuels - Burning coal and oil releases SO_2 & NO_x .
- Industries - Factories, smelting, mining add pollutant.

- * Reaction:- • SO_2 react with O_2 and H_2O $\xrightarrow{\text{form}}$ H_2SO_4



- NO_x react with atmospheric moisture $\xrightarrow{\text{form}}$ HNO_3 .



* Impacts:-

- Environmental:- Damage lakes, river, forest & soil
- Corrosion- Corrodes Marble, Limestone, metals
(eg- $\text{CaCO}_3 + \text{H}_2\text{O} = \text{gypsum}$)
- Health:- PM & acid Rain can worsen respiratory system & cardiovascular issue.
- Biodiversity- Harm aquatic life, fishes, amphibians also releases toxic metal like aluminium.

iv-

"Air quality Parameter"

Scientist measure air pollutants using:-

1- Air Quality Index (AQI):-

- Single No. showing overall air's quality
- Measure pollutants such as PM, O_3 , CO, SO_4 , NO_2 .

2- Particulate Matter (PM)

- Measure fine & coarse particles in air.
- PM 2.5 measure small particles; PM-10 measure particle with 10 micrometer.

3- Gas Monitoring:-

- Instrument used:- Gas chromatographs & gas sensors
- Measure gases like SO_2 , NO_2 , CO, O_3 .

4- Remote Sensing:- Satellites have a sensor attached to them, that measure the air quality.

5- Health Impact Assessment:- Uses health data.

- poor air quality will result ^{as} poor health.

v- "Methods to Measure Air Quality"

(a) To measure particulate Matter (PM)

- Beta Attenuation Monitor:-

- Measure PM by passing beta radiation through a filter with particles.

- Radiation attenuation $\propto$ particles mass conc.

- Gravimetric Method:-

- Collects PM on a filter -for a fixed time.

- Filter weighed before and after collection.

to determine Mass of particles -for conc.

- Optical Particles Counter:-

- Uses light/laser scattering for particles size and concentration of mass.