22.4.24

TENDER HEART HIGH SCHOOL, SEC-33B, CHD

CLASS- VIII SUBJECT- CHEMISTRY

CHAPTER- 8 TEACHER- MOHINISHA THAKUR

Good morning to all the students!

Students this lesson is for class- IX for the subject of chemistry, 'Topic'- 'Compounds of sulphur as pollutants' which is covered in chapter- 8 'Atmospheric pollution' starting on page no- 130 of your textbook titled- concise chemistry by 'Selina Publication' and is being submitted to you on 22 April, 2024

All students may now please open page no- 130 of your notebook in front of you.

If all students are ready then let us start with this chapter. All students may now please listen carefully.

Compounds of sulphur as pollutants:-

Compounds of sulphur like sulphur dioxide (SO_2), sulphur trioxide (SO_3) and hydrogen sulphide (H_2S) are pollutants.

1. **Hydrogen Sulphide (H_2S):-** is produced by decaying organic matter, such as rotten vegetables, by sewage and certain industrial operations.

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Students, you may read or learn 'Harmful effects of hydrogen sulphide' and 'Harmful effects of oxides of sulphur' from your chemistry notebook given on pg no - 130.

Next, we will discuss 'Carbon monoxide (CO) as air pollutant'

Carbon monoxide (CO) as air pollutant :-

By incomplete combustion of fuels in homes, factories and automobiles, carbon monoxide is formed. It is a highly poisonous gas.

It reduces the oxygen-carrying capacity of blood by an amount equivalent to the amount of haemoglobin converted into carboxy haemoglobin.

Haemoglobin + CO → Carboxy haemoglobin.

Since heart and brain are the two tissues most sensitive to oxygen depletion, they show the most serious effects of carbon monoxide exposure. In high concentration, carbon monoxide may thus kill by paralyzing normal brain action.

Certain points to 'Control of carbon monoxide pollution' are given on pg no - 130 or 131 of your chemistry notebook.

(P.T.O)

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Students, now we will discuss the topic 'Acid Rain'

ACID RAIN

The term 'acid rain' is used to describe all precipitations - rain, snow, fog, dew - that are more acidic than normal water. Normal rain is only slightly acidic, having pH about 5.6; this is because carbon dioxide reacts with it to form weak carbonic acid.

$$CO_2 + H_2O \rightarrow H_2CO_3$$

pH of acid rain usually ranges between 5.6 and 3.5; at times it can be as low as 2.

Composition of Acid Rain :-

Acid rain results from acids like nitric acid and sulphuric acid present in polluted air. These acids are formed when oxides of nitrogen and sulphur come into contact with rain water.

Causes of Acid Rain :-

Compounds of nitrogen and sulphur in addition to carbon is produced by fossil fuels. Due to combustion of these fuels, large amount of sulphur dioxide, oxides of nitrogen and

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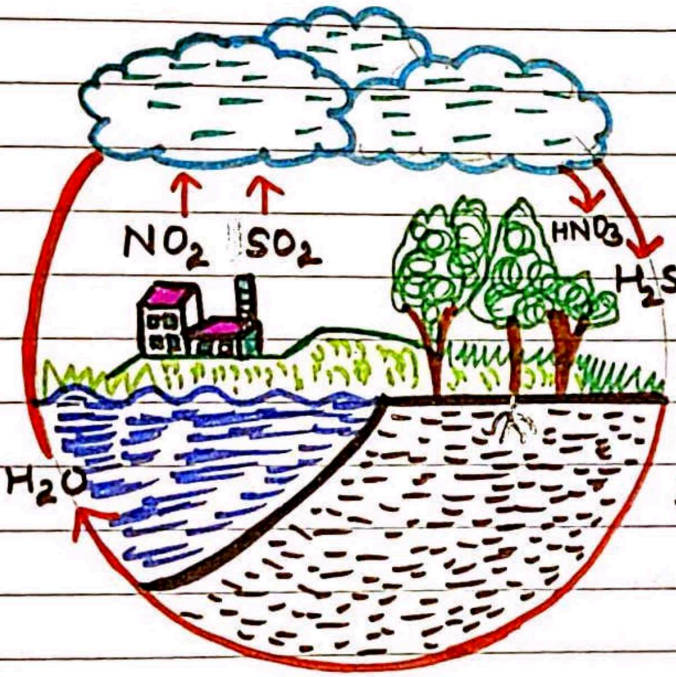
and carbon dioxide get discharged into the atmosphere. These oxides dissolve in rain water forming mineral acids.

The main cause of acid rain is the formation of mineral acids like carbonic acid, nitric acid and sulphuric acid, during rains.



Formation of Nitric acid :-

1) Nitric acid is formed by the combination of nitrogen and oxygen, i.e, oxides of nitrogen.
2) Nitrogen and oxygen combine in the presence of thunder and lightning.
3) Oxides of nitrogen are also produced by internal combustion engines (automobile engines)

$$N_2 + O_2 \xrightarrow[(3000^\circ C)]{\text{High Temperature}} 2NO$$

4) Nitrogen oxide then gets oxidized in the atmosphere (P.T.O)

to nitrogen dioxide.

$$2NO + O_2 \rightarrow 2NO_2$$

5) Nitrogen dioxide combines with water to form a mixture of nitrous acid and nitric acid.

$$2NO_2 + H_2O \rightarrow HNO_2 + HNO_3$$

Formation of Sulphuric acid :-

1. Coal used in power plants contains upto 4% sulphur. Combustion of coal forms sulphur dioxide. Petroleum products also release sulphur dioxide on combustion.
2. Sulphur is a non-metallic element found in coal (fossil fuels) and fuel oil.
3. When these fuels are burned, sulphur combines with oxygen in air to form its gaseous oxides, sulphur dioxide (SO_2) and sulphur trioxide (SO_3).

$$S + O_2 \rightarrow SO_2$$
$$2SO_2 + O_2 \rightarrow 2SO_3$$

4. Sulphur dioxide and sulphur trioxide react with water to form H_2SO_4, which is the main cause of acid rain.

$$2SO_2 + O_2 + 2H_2O \rightarrow 2H_2SO_4$$
$$SO_3 + H_2O \rightarrow H_2SO_4$$

You may read the 'Impact of acid Rain' and 'Reducing the impact of Acid Rain' on page

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no - 132 of your chemistry notebook

Students, next we will discuss the topic :- 'Global Warming'

GLOBAL WARMING

"Global Warming" refers to the rise in global temperatures due mainly to the increasing concentrations of greenhouse gases in the atmosphere.

Some heat is also trapped by green house gases, i.e. carbon dioxide, methane, nitrous oxide, ozone, chloro - fluoro - carbon compounds (CFC) and water vapour present in the atmosphere. This cause Global warming.

Green house effect :-

Heating of the earth and its environment due to solar radiation trapped by carbon dioxide and water vapour in the atmosphere is called greenhouse effect.

Greenhouse gases :-

Gases involves in greenhouse effect are oxides of nitrogen, carbon dioxide, water vapour, chloro-fluro-carbons, ozone, methane etc.

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and are thus called green house gases.

Sources of greenhouse gases:-

The main sources are:-

1. Carbon dioxide:-

- Burning of fossil fuels like coal, natural gas and petroleum.
- Industrial processes like manufacture of lime and those seen in fermentation units.
- Biological decay of plants.
- Respiration by animals, plants and human beings

2. Water vapours:-

The main source of water vapour is burning of hydrocarbons. This produces carbon dioxide and water vapour

Hydrocarbon + Oxygen → Carbon dioxide + Water vapour.

3. Oxides of Nitrogen:-

Combustion of fossil fuels like coal, oil, natural gas, gasoline, etc. in automobiles and power plants produce high temperatures, whereupon nitrogen and oxygen combines to form nitric oxide & nitrogen dioxide. Some chemical

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industries also produce oxides of nitrogen as by-products.

4. **Methane :-**
It is emitted in large quantities during anaerobic decomposition of organic matter in soil, water and sediments. Incomplete combustion of fossil fuels also produces methane and other hydrocarbons.

Students, next we will discuss the topic :- 'Mechanism of Green House Effect'

Mechanism of Green House Effect :-

1. Sunlight reaching the earth consists of three types of radiations, namely, ultraviolet (U.V) radiation, visible radiation and infra-red (IR) radiation.

2. As sunlight passes through the atmosphere, most of the UV radiation is absorbed by ozone; 30% of IR radiation reaches the earth's surface, heating up the surface.

3. As the earth becomes hot, it starts emitting radiations with less energy than the incoming radiations and thus with longer wavelength.

4. Some emitted infrared radiations escape from

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the earth's surface and some are absorbed by CO_2, thus remaining on the earth.

5. Trapped radiation warms both the earth's surface and the lower parts of the atmosphere.

Students you may observe fig 8.4 through which you may be able to understand the mechanism of green house effect on pg no 134 of your chemistry notebook.

Read 'Advantages of Green House effect' and 'Ways of Reducing Global Warming' given on pg no 134 of your Notebook.

Now, I will give you three a very short Questions. You will get a three minutes break to write the answers.

The Questions are:-

Q1:- What is the pH of acid rain?

Q2:- Complete the reaction.

$$SO_2 + O_2 + H_2O \rightarrow$$

Q3:- Name two sources of greenhouse gases:-

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I hope you all have written the answers by now. Let us check the answers now.

Ans1°- between 5.6

Ans2°- $2SO_2 + O_2 + 2H_2O \rightarrow 2H_2SO_4$

Ans3°- Carbon dioxide and methane.

Now, I am ending the lesson for today by giving 'Instructions' and 'Homework'.

INSTRUCTIONS And HOMEWORK

Revise and learn all the topics which we have done today. Do Questions 2, 5, 26 of Exercise 8(B) and Questions 4, 5, 6 and 8 of Exercise 8(C)

(End)