CBSE TEST PAPER 03

CLASS XI CHEMISTRY (Environmental Chemistry)

General Instruction:

- All questions are compulsory.
- Marks are given alongwith their questions.

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1. What is smog? [1]

2. The London smog is caused in which season and time of the day? [1]

3. Name two air pollutants which forms photochemical smog. [1]

4. Name two gases which form acid rain. [1]

5. Which acid is present is the acid rain? [1.5]

6. What is PAN? [1]

7. What is the composition of photochemical smog? [2]

8. When does rain water become acid rain? [1]

9.Why does rain water normally have a pH of about 5.6? When does it become acid rain, [3]

10. How can photochemical smog be controlled? [2]

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[ANSWERS]

Ans 01. Smog is a mixture of solid and liquid fog and smoke particles formed when humidity is high and the air so calm that smoke and fumes accumulate near their source. Smog is caused by a number of different pollutants and has some rather serious negative effects on people, animals, and plant life. Dense urban areas suffer the worst from smog specifically during prolonged periods of heat inversion that often create a smog-trapping ceiling over a city.

Ans 02. The London smog is caused during summer season and in the afternoon part of the day when it is very hot.

Ans 03. PAN and O_3.

Ans 04. SO_2 and NO_2.

Ans 05. The acids present in the acid rain are
$H_2SO_4, HNO_3 \ and \ HCl.$

Ans 06. PAN (Peroxyacytyl nitrate) is a toxic chemical that is an important component of smog. PAN is a gas at normal temperatures and pressures. Its chemical formula is $C_2H_3O_5N$. PAN molecules are composed of carbon, hydrogen, oxygen, and nitrogen atoms.

Ans 07. Photochemical smog is formed as a result of photochemical reaction (i. e; in the presence of sunlight) between oxides of nitrogen and hydrocarbons.

Ans 08. When pH of rain water becomes as low as 2 to 3.5. It forms acid rain.Acid rain is caused by a chemical reaction that begins when compounds like sulfur dioxide and nitrogen oxides are released into the air.

Ans 09. Rain water normally has a pH of 5.6 due to the formation of H^+ ions from the reaction of rain water with CO_2 present in the atmosphere.
$H_2O + CO_2 \rightarrow 2H^+ + CO_3^{2-}$
When the value of pH drops below 5.6, it becomes acidic. Acid rain is also formed due to the presence of oxides of sulphar and nitrogen in the atmosphere.

$2SO_2 + O_2 + 2H_2O \rightarrow 2H_2SO_4$
$4NO_2 + O_2 + 2H_2O \rightarrow 4HNO_3$.

Ans 10. If we control the primary precursors of photochemical smog such as NO_2 and hydrocarbons, the secondary precursors such as ozone and PAN, the photochemical smog will automatically be reduced. Usually catalytic converters are used in the automobiles which prevent the release of nitrogen oxide and hydrocarbon to the atmosphere. Certain plants eg. Pines, Juniparus, Quercus, Pyrus and Vitis can metabolise nitrogen oxide and their plantation could help in this matter.