

Question 21 (7 marks)

Evaluate the impact of industrial sources of sulfur dioxide and nitrogen oxides on the environment, making use of appropriate chemical equations.

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SO_2 ~~can be~~ is produced by the effects of volcanic eruptions, let SO_2 gases into the air, fossil & factory fuels, photochemical smog.

NO_x (nitrogen oxides) are released into the environment through car, plane, train, pollution, factory pollutants, photochemical smog.

Such gases like $\text{SO}_2 + \text{NO}_x$ are detrimental to our society & the environment. They can create much havoc by adding to the greenhouse effect, damage the ozone layer as well as produce acid rain & cause health effects, such as eye irritation, rather if too much of this pollution is in the air.

In the case of SO_2 = chemically, $\text{SO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{SO}_3(\text{aq})$, this produces acid rain which can damage precious, valuable, & historic limestone sculptures, marble buildings. The acidic nature of the rain, (H_3O^+) oxidises & eats away at objects, & corrodes them. $\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{SO}_3(\text{g})$, it can also promote harmful gases release into the atmosphere.

NO_x adds to the depletion of the ozone layer.

$\text{NO}_2(\text{g}) + \text{O}_3(\text{g}) \rightarrow \text{NO}(\text{g}) + 2\text{O}_2(\text{g})$, the depletion of the ozone layer not only increases U.V.b rays ~~from~~ reaching earth damaging

DNA & increasing cancer, but can cause environmental effects, heating up

the earth by adding to the greenhouse effect. The problem of $\text{SO}_2 + \text{NO}_x$

being released in the ~~earth~~ ^{atmosphere} can only be helped by stopping, minimising

its consumption. Luckily the reaction can be reversed, although these gases

cannot be washed out rain, but needs to be evaporated into the atmosphere above the troposphere, the tropopause. Also nations have a duty to help this problem, done through the Montreal Protocol in 1992 where many countries have signed to help reduce the rate of use of $\text{SO}_2 + \text{NO}_x$ in the air.