

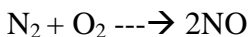
P- BLOCK ELEMENTS

VALUE BASED QUESTIONS

Q1. Free radicals are odd electron species which have often been associated with damaging effects such as ageing, rancidity of oils and production of cancerous cells. However, there are some free radicals which are very important in biological processes. One such molecule is nitric oxide which our body produces to help its 50 trillion molecules to communicate with each other. Now answer the following question:

- i) **How is nitric oxide produced in nature?**
- ii) **How does sorbitrate or nitroglycerine work to check angina pain?**
- iii) **Viagra is a sex stimulant for males. How does it work./**

Ans: Nitrogen & Oxygen of air combine during lightening in thunderstorm to form nitric oxide.



It is a free radical. $\text{N}=\text{O}$ & hence very reactive.

ii) Sorbitrate i.e. nitroglycerine produces NO which dilates arteries & maintains blood pressure. So, removing angina pain.

iv) Viagra produces small amount of NO in the blood stream which stimulates the man for sexual act.

Q2. The ozone present in upper stratosphere protects us from harmful radiations of the sun but on the earth it makes life difficult. Furthermore, in the recent years, the excessive use of some aerosols propellants & refrigerants have depleted the O₃ layer which has contributed to the global warming. Answer the following questions:

- a) **How does O₃ in the stratosphere protect us from harmful radiations of the sun.**
- b) **Name two chemicals which are mainly responsible for the O₃ depletion in the stratosphere.**
- c) **Explain how the presence of excess O₃ on the earth makes life difficult.**
- d) **How does presence of excess O₃ on the earth cause economic damage?**

Ans . a) O₃ is formed in the upper atmosphere. It absorbs UV radiation & thus protects us from harmful radiations of the sun. If there were no O₃ layers more UV radiations will reach the surface of earth causing damage to plant & animal life.

b) The two chemicals are NO & Cl₂F₂.

c) O₃ is a powerful oxidizing agent & is very reactive.

This makes it very irritant to the respiration system causing lung inflammation, decreasing lung function & increasing chest pain & coughing.

d) Being a strong oxidizing agent, O₃ causes rubber to harden & crack thereby shortening the life of automobile tyres & other rubber items.

It also causes extensive damage to crops especially to tobacco & tomato.

Q3. Polyphosphates are often used as builders in detergents. The main function of polyphosphates is to reduce the hardness of water but at the same time it also increases the detergent synergistic process. However, excessive use of polyphosphates as water softeners is discouraged by environmentalists because it leads to water pollution in lakes, rivers & other waterways.

Now answer the following questions:

i) Name two polypeptides which are used as water softeners in detergents

ii) How do polyphosphates soften water? Explain.

iii) How do polyphosphates cause water pollution? Explain.

Ans: i) The two commonly used polyphosphates as water softeners in detergents are :

a) Sodium tripolyphosphate, Na₅P₃O₁₀ b) Sodium, hexametaphosphates, Na₂ [Na₄(PO₃)₆]

b) These polymetaphosphates form soluble complexes with Ca²⁺ & Mg²⁺ ions thereby making them ineffective

c) $2\text{Ca}^{2+} + \text{Na}_2 [\text{Na}_4(\text{PO}_3)_6] \longrightarrow \text{Na}_2[\text{Ca}_2(\text{PO}_3)_6] + \text{Na}^+$
Soluble complex

$2\text{Mg}^{2+} + \text{Na}_2 [\text{Na}_4(\text{PO}_3)_6] \longrightarrow \text{Na}_2[\text{Mg}_2(\text{PO}_3)_6] + \text{Na}^+$
Soluble complex

iv) These polymetaphosphates nourish bacteria which grow excessively and deplete water of dissolved O₂ thus killing fish & other small aquatic animals. So, in USA, the use of polyphosphate in laundry has been banned in some states.

Q.4 Ammonium nitrate is widely used as a high nitrogen fertilizer in agriculture. It has also been used in instant cold packs used to reduce swelling from sports injuries. Ammonium nitrate mixed with fuel oil is one of most popular explosives used for coal mining and demolition of buildings. But unfortunately, in recent years, this explosive has been in terrorist attacks in India and around the world.

Now answer the following questions;

(i) What are cold packs? How do they work to reduce swelling from sports injuries?

(ii) How does ammonium nitrate –fuel oil mixture act as an explosive?

(iii) Should the production of ammonium nitrate be banned? Give your suggestions.

Ans : i) cold pack has two compartments one contains solid ammonium nitrate and another contains water. When it is hit or squeezed hard enough to break the walls between two compartments and cause ammonium nitrate to mix with water, endothermic reaction takes place and temperature drops. It takes heat from injured muscles and keeps comfort to the sportsmen.

ii) Ammonium nitrate is both oxidized and reduced. Ammonium ion is reducing agent whereas nitrate ion is the oxidizing agent. As a result fuel oil gets oxidized and a large volume of gases is produced which causes explosion.

iii) because of the usefulness of the material, its production cannot be banned. Instead its sale /availability should be regulated /licensed.

Q.5 Manoj went to a paper industry. The manager of paper industry insisted that H_2O_2 be used for bleaching instead of chlorine in bleaching. Manoj had learnt that Cl_2 is also a bleaching;

(a) Then why is H_2O_2 used instead of Cl_2 ? **2**

(b) What value do you derive from this ? **1**

Ans (a) H_2O_2 after bleaching, the product formed is water. While when using chlorine the by product is HCl.

(b) Seeing the product of the reaction we should select the reagents, so there is **minimum pollution.**