Nitrogen in Chemistry Questions with Solutions

Q1. The atomic number of nitrogen is:

a.) 6
b.) 7
c.) 8
d.) 9

Correct Answer– (b.) 7

Q2. The symbol for nitrogen atom is:

a.) N
b.) Ni
c.) Nt
d.) Ng

Correct Answer– (a.) N

Q3. Two nitrogen atoms are joined by how many covalent bonds?

a.) one
b.) two
c.) three
d.) ionic bond

Correct Answer– (c.) three

Q4. What is the valency of a nitrogen atom?

a.) 2
b.) 3
c.) 1
d.) 0

Correct Answer– (b.) 3

Q5. Nitrogen is a ____.

a.) metal

b.) non-metal
c.) metalloid
d.) None of the above

Correct Answer– (b.) non-metal

Q6. What is the electronic configuration of nitrogen?

Answer. The general electronic configuration of nitrogen is $1s^2$, $2s^2$, $2p^3$.

Q7. Is nitrogen gas N or N_2?

Answer. Nitrogen has the chemical formula N, but because it exists in a molecule of two ions, the chemical symbol for nitrogen gas is N_2.

Q8. How do plants absorb nitrogen?

Answer. Plants cannot absorb nitrogen directly from the atmosphere. Only nitrifying bacteria in soil can convert gaseous nitrogen into nitrites or nitrates. Through their root hairs, plants can absorb nitrate or nitrite from the soil.

Q9. Where is nitrogen found?

Answer. Nitrogen can be found in the soil, water, and the air. Nitrogen is the most abundant element in the Earth's atmosphere, accounting for approximately 78% of the total.

Q10. What is the position of nitrogen element in the periodic table?

Answer. Nitrogen (N) has an atomic number 7, which indicates that it is placed in the second period and 15th group.

Q11. State the properties of nitrogen.

Answer. The physical properties of nitrogen are as follows:

- It is generally inert.
- It is non–metallic.
- It is colourless.
- It is odourless.
- It is tasteless.
- It exists as a diatomic gas.
- Its atomic number is 7.
- it has an atomic weight of 14.0067.
- Nitrogen is slightly lighter than air.

Q12. What is nitrogen fixation?

Answer. Nitrogen fixation is a necessary biological process that occurs at the beginning of the nitrogen cycle. Nitrogen in the atmosphere is converted into ammonia (another form of nitrogen) in this process by certain bacterial species such as Rhizobium, Azotobacter, and others, as well as by natural phenomena.

Q13. What are the uses of nitrogen gas?

Answer. Some of the uses of nitrogen are as follows:

- Nitrogen gas is used to create an unreactive environment, which protects foods from degradation.
- Nitrogen is used in some aircraft fuel systems to reduce fire hazards.
- The chemical industry also relies on nitrogen. It is used to make fertilisers, nitric acid, nylon, dyes, and explosives.
- Since nitrogen is a non-reactive gas, it is used to fill light bulbs.
- Nitrogen is frequently used in the pharmaceutical industry to transfer a reaction mixture from one vessel to another.

Q14. Discuss some laboratory methods to obtain nitrogen.

Answer. There are several methods for preparing nitrogen from its compounds in the laboratory on a small scale.

- A hot aqueous solution of ammonium nitrite spontaneously decomposes to yield elemental nitrogen and water.
- Heating barium or sodium azide (NaN_3 or $Ba[N_3]_2$) produces free nitrogen as well.
- When ammonia gas is passed over a hot metallic oxide, free nitrogen, free metal, and water are formed.
- The reaction between ammonia and bromine produces nitrogen and ammonium bromide.

Q15. Describe the nitrogen cycle.

Answer. The Nitrogen Cycle is a biogeochemical process in which nitrogen is converted into various forms before passing from the atmosphere to the soil to the organism and back into the atmosphere. It involves several processes such as nitrogen fixation, nitrification, denitrification, decay and putrefaction.

- Nitrogen Fixation– The nitrogen cycle begins with this step. This step is characterised by the conversion of atmospheric N_2 into ammonia (NH_3). Bacteria such as Azotobacter and Rhizobium play an important role in this process. They live in the roots of leguminous plants and aid in the conversion of inert nitrogen to ammonia.
- Assimilation– Plants use their roots to absorb nitrogen compounds from the soil, which are available in the form of ammonia, nitrite ions, nitrate ions, or ammonium ions and are used in the formation of plant and animal proteins. When the primary consumers eat the plants, it enters the food web.

- Ammonification– When plants or animals die, the nitrogen in the organic matter returns to the soil. Organic matter is converted back into ammonium by decomposers, which are bacteria or fungi found in the soil. This decomposition process generates ammonia, which is then used in other biological processes.
- Nitrification– The presence of bacteria in the soil converts ammonia to nitrate during this process. Nitrites are formed through the oxidation of ammonia by Nitrosomonas bacteria species. Nitrobacter then converts the nitrites produced into nitrates. This conversion is critical because ammonia gas is toxic to plants.
- Denitrification– Denitrification is the process by which nitrogen compounds return to the atmosphere after being converted from nitrate (NO_3^-) to gaseous nitrogen (N). This is the final stage of the nitrogen cycle and occurs in the absence of oxygen. The denitrifying bacterial species Clostridium and Pseudomonas are responsible for denitrification.

Practise Questions on Nitrogen

Q1. Nitrogen forms a ____.

a.) cation
b.) anion
c.) both cation and anion
d.) None of the above

Correct Answer– (b.) anion

Q2. The correct electronic configuration of nitrogen is-

a.) 2, 7
b.) 2, 5
c.) 2, 8 , 5
d.) None of the above

Correct Answer– (b.) 2, 5

Q3. How can nitrogen be separated from air?

Answer. Nitrogen is almost entirely produced commercially from air, most commonly through fractional distillation of liquid air. In this process, air is first cooled to a temperature below the boiling points of its major constituents, which is less than -328°F (-200°C). The liquid air is then allowed to warm up, allowing the mixture's lower-boiling-point nitrogen to evaporate first. The nitrogen gas that escapes from the liquid air is then captured, cooled, and liquefied again.

Q4. What is the importance of the nitrogen cycle?

Answer. The nitrogen cycle is important for the following reasons:

- Helps plants in the synthesis of chlorophyll from nitrogen compounds.
- Through the biochemical process, it helps in the conversion of inert nitrogen gas into a usable form for plants.
- Bacteria help in the decomposition of animal and plant matter during the ammonification process, which indirectly helps to clean up the environment.
- Nitrates and nitrites are released into the soil, thereby enriching it with the nutrients required for cultivation.
- Nitrogen is an essential component of the cell, forming many important compounds and biomolecules.

Q5. What s liquid nitrogen?

Answer. Liquid nitrogen is a form of the element nitrogen that is cold enough to exist as a liquid and is used in a variety of cooling and cryogenic applications.

- Nitrogen is a liquid below 195.8° C or 320.4° F and a solid above 209.86 °C or 345.75 °F at normal pressure. It is so cold at these low temperatures that tissues immediately freeze.
- It is commercially produced through the fractional distillation of liquid air.
- It is made up of two nitrogen atoms that share covalent bonds, just like nitrogen gas (N_2).
- Liquid nitrogen is also known as LN2, LN, or LIN.