BYJU'S EXAM PREP

Important Questions on Nitrogen Metabolism

1. Match the following and choose the correct option.
I) Frankia
II) Anabena
III) Brady rhizobium
A). Soyabean
B). Azolla
C). Casuarina
Options
A. I-A, II-B, III-C
B. I-C, II-B, III-A
C. I-B, II-C, III-A
D. None

2. In soil, by the addition of nitrogen containing fertilizer, gas exchange process is affected. Which of these is true statement regarding this.
A. It causes production of antibiotic in bacteria which leads antibiotic resistance.
B. This addition results in release of NO and N2O which is greenhouse gas
C. It causes consumption of methane gas.
D. It causes production of methane gas.

3. Match the following and choose the correct option:
I) Conversion of organic nitrogen into ammonia
II) Conversion of Nitrite or nitrate into atmospheric nitrogen
III) Conversion of atmospheric nitrogen into ammonia
IV) Conversion of ammonium ion into nitrite or nitrate
A). Nitrification
B). Ammonification
C). Nitrogen fixation
D). Denitrification
Options
A. I-B, II-D, III-C, IV-A
B. I-D, II-B, III-C, IV-A
C. I-B, II-C, III-D, IV-A
D. I-B, II-D, III-A, IV-C

4. Root nodules of legume plants contains leghaemoglobin, what is its function?
A. Regulate oxygen supply.
B. Regulate growth of nodules.
C. Regulate denitrogenase activity.
D. Regulate the expression of nif gene.

5. During biological nitrogen fixation, how many ATP molecules are required for the conversation of one nitrogen into two ammonium ions?
A. 16 ATP
B. 12 ATP
C. 10 ATP
D. 8 ATP

6. Regarding the conversion of NO3 - into NO2- which occurs in plant cell, following statement are given:
I. This conversion is catalysed by nitrate reductase.
II. This conversion occurs in cytosol.
III. This conversion reduces ferredoxin and act as electron donor.
IV. This conversion requires Mo and FAD as cofactor.
Choose the correct option;
A. I only
B. I, II and IV
C. I & III
D. None

7. Which statement is correct about nitrate reductase?
A. Nitrate reductase is very sensitive towards oxygen.
B. FADH2 act as an electron donor.
C. FAD, Mo and haem act as prosthetic group.
D. It catalyses conversion of NO2- to NH4+.

8. Plants assimilate nitrate by?
A. Roots
B. Shoots
C. Both
D. None

9. Three statements are given about nitrogenase complex;
I) Ferredoxin reduces fe protein.
II) Fe protein reduces Mo-fe protein
III) Mo-fe protein reduce nitrogen
Which statement is correct?
A. Only I
B. Only II
C. I, II and III
D. None

10. Which statement is not correct about nitrogen fixation?
A. Nitrogenase complex catalyse the reduction of nitrogen.
B. It requires metabolic energy.
C. This process is carried out by only few organisms known as Diazotroph.
D. None

Answer & Explanation

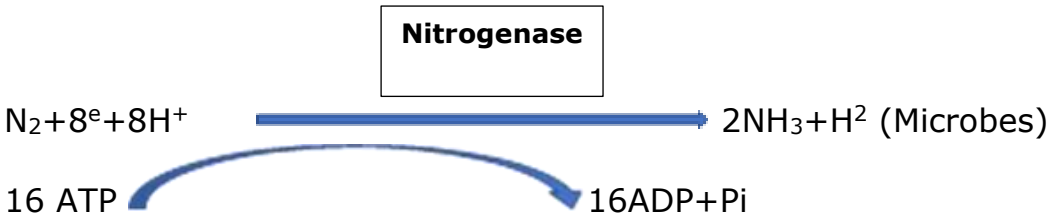
1. Ans. B.
The given pairs represent symbiotic association of plant and nitrogen fixing microorganism, in which Frankia is symbiotically associated with Casuarina; Anabena with free-floating Azolla plant and Brady rhizobium with Soyabean.

2. Ans. B.
In soil, by the addition of nitrogen containing fertilizer gas exchange process is affected, this type of addition results in the release of NO and N2O.

3. Ans. A.
In the process of nitrogen metabolism, conversion of atmospheric nitrogen into ammonia is known as nitrogen fixation;
$N_{2(atmospheriC.}$ + 8 H^+ + 8 e^- → 2 NH_3 + H_2
and conversion of organic nitrogen into ammonia is called as ammonification.
$NH_2\text{-}CO\text{-}NH_2 + H_2O\ (l) \rightarrow 2NH_3(g) + CO_2\ (g)$
The process of conversion of nitrite or nitrate into atmospheric nitrogen is known as denitrification; NO_3^{2-}(Nitrate)- ⟶ NO_2^{2-}(Nitrite) ⟶ NO (Nitric oxide) ⟶ N_2O(Nitrous oxide) ⟶ $N_{2(atmospheric)}$
and conversion of ammonium ion into nitrite or nitrate is termed nitrification.
NH3 + 1.5 O2 --> NO2- + H+ + H20

4. Ans. A.
Leghaemoglobin is red coloured pigment which is found in root nodules of legume plants it combines with oxygen and helps in oxygen removal from nodules. Growth of nodule in legumes is regulated by chemical signals between plant and symbiotic microbes. Concentration of NO (nitric oxide) regulates the denitrogenase activity. Expression of nif gene is induced by a response of low oxygen and fixed nitrogen concentration and it is regulated by operon of microbes.

5. Ans. A.
During biological nitrogen fixation, 8 ATPs are required for the conversation of one nitrogen into one ammonium ion so in the formation of two ammonium ions, 16 ATP is required.



6. Ans. B.
In biological nitrogen fixation conversion of NO_3^- into NO_2- which takes place in plants, this conversion requires Mo and FAD as cofactor, and it is catalysed by nitrate reductase and this process occurs in the cytosol.

7. Ans. C.
FAD, Mo and haem act as prosthetic group to nitrate reductase enzyme in higher plants.

8. Ans. C.
Plants known as cocklebur in which nitrogen metabolism is restricted to shoot, or in the white lupin; plant nitrate is metabolised in shoot so nitrate is assimilated by root and shoot both.

9. Ans. C.
In the reaction catalysed by nitrogenase complex in plants, ferredoxin reduces Fe protein. Binding and hydrolysis of ATP to fe protein causes confirmational change of fe protein which facilitate the redox reaction. Fe protein reduce Mo-fe protein and Mo-fe protein reduces the nitrogen.

10. Ans. D.
In the process of nitrogen fixation, reduction of atmospheric nitrogen is facilitated by nitrogenase complex, this process is carried out by nitrogen fixing microbes known as Diazotrophs and the process requires metabolic energy.

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