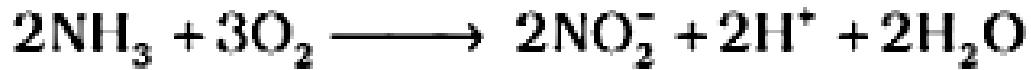


## Important Formulas:

### Nitrification equations-



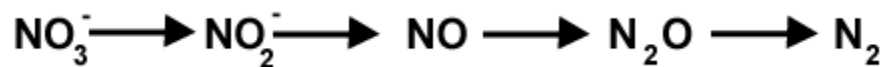
Ammonia is first oxidized to nitrite by the bacteria Nitrosomonas and/or Nitrococcus.

The nitrite is further oxidized to nitrate with the help of the bacterium Nitrobacter.

These nitrifying bacteria are known as chemoautotrophs.

[Refer page 201; NCERT 2021-22]

### Denitrification equation-



Denitrification is carried by bacteria Pseudomonas and Thiobacillus.

### Biological Nitrogen fixation-

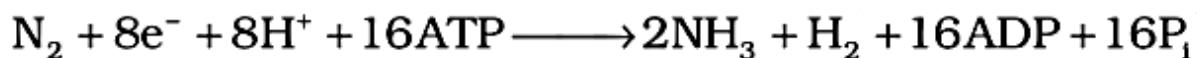


This is performed by – free-living nitrogen fixing microbes, such as - aerobic microbes like Azotobacter and Beijerinckia and anaerobic microbes like Rhodospirillum.

Cyanobacteria such as Anabaena and Nostoc are also free-living nitrogen-fixers.

[Refer page 202; NCERT 2021-22]

### Symbiotic biological nitrogen fixation-



The enzyme nitrogenase is a Mo-Fe protein that is present along with leghaemoglobin in the root nodule infested with Rhizobium. It catalyzes the conversion of atmospheric nitrogen to ammonia which is the first stable product of nitrogen fixation.

[Refer page 203; NCERT 2021-22]

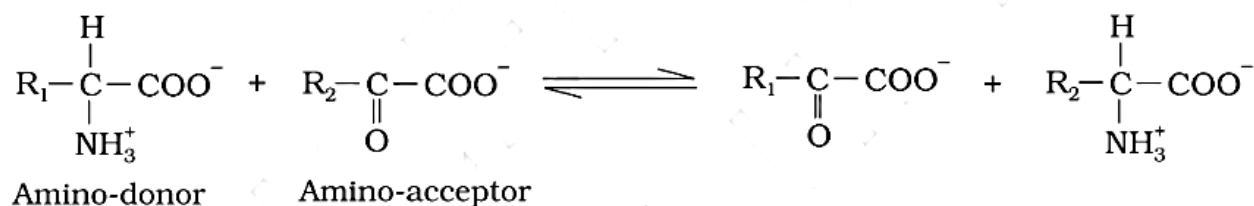
### Fates of ammonia-

This ammonia formed through biological and symbiotic Nitrogen fixation is further fixed. It has one of the two fates-

Formation of glutamic acid by reductive amination:



Formation of amino acids by transamination:



[Refer page 204; NCERT 2021-22]