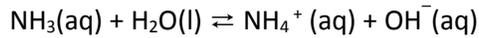


Ammonia Removal

Ammonia is a colourless gas with a characteristic pungent smell. It is a common nitrogenous waste, particularly among aquatic organisms, and it contributes significantly to the nutritional needs of terrestrial organisms by serving as a precursor to food and fertilizers. Ammonia reacts in water to form ammonium ion and hydroxyl ion:

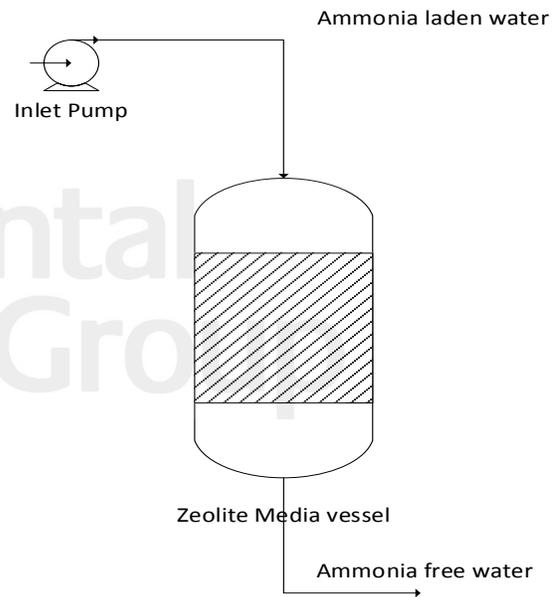


When ammonia is present in water at high enough levels, it is difficult for aquatic organisms to sufficiently excrete the toxicant, leading to toxic buildup in internal tissues and blood, and potentially death. Environmental factors, such as pH and temperature, can affect ammonia toxicity to aquatic animals. Furthermore, ammonia is also known to causing caustic corrosion cracking to metallic pipelines in the process water streams.

CCG's solution for Ammonia removal

CCG's Zeolite media is a naturally occurring adsorbent called clinoptilolite. The molecular ratio of silicon to aluminum is 4.9. The bulk density of the material is 49-51 pounds per cubic foot. The hardness on the Mohs Scale is 4.0 and the specific surface area is 40 square meters per gram. The material is thermally stable to 650 degrees Celsius and is stable at pH's as 1.0 and as high as 13.0.

Just like ion exchange, ammonia in its cationic form (ammonium ion) enters the media vessel containing the zeolite and passes over the bed of media. The ammonium ion gets adsorbed onto the surface of the media and in the process, ammonia is removed from the water stream. The following diagram demonstrates the process operation.



Operating Parameters:

- Empty Bed contact time: 10 minutes minimum
- Removal Capacity: 3 lbs pf Ammonia for 100 lbs of Zeolite media (2 cu.ft)
- No cations are present in the water except ammonium ion, as they can compete for adsorption sites
- 1.5% Loading weight of Ammonia on the Zeolite