

### Reaction pathway of the catalytic oxidation of aqueous ammonia to molecular nitrogen

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Aqueous phase catalytic wet air oxidation of ammonia was studied over Ru/TiO<sub>2</sub> catalyst in a batch reactor by changing the solution pH, concentration of catalyst in the solution, temperature, and reaction time. The oxidation reaction of ammonia over Ru/TiO<sub>2</sub> catalyst was found to take place exclusively for the aqueous NH<sub>3</sub> with a preferred mode in strong alkaline pH region. An oxidation reaction pathway was proposed as following: Oxidation of ammonia was initiated by the reaction of aqueous ammonia with catalytically activated oxygen. After undergoing further successive oxidation reactions with activated oxygen, ammonia was finally oxidized to a molecule of nitrous acid. Nitrous acid dissociates into a nitrite ion and a proton. The solution pH was decreased with the protons from the dissociation of HNO<sub>2</sub> so that the solution concentration of NH<sub>4</sub><sup>+</sup> was increased. Molecular nitrogen as a final product was produced from the homogeneous aqueous phase reaction between ammonium ion and nitrous ion. Further reaction of nitrous ion with the activated oxygen led to the formation of nitrate ion as another final product.