

Answer on Question #60317, Chemistry / General Chemistry

1. One of the stages of production of nitric acid involves the reaction between ammonia and oxygen to form nitrous oxide: $4\text{NH}_3 (\text{g}) + 5\text{O}_2 (\text{g}) = 4\text{NO} (\text{g}) + 6\text{H}_2\text{O} (\text{g}) + \text{heat}$ Explain four methods that could allow an industrial chemist to increase the yield in nitrous oxide.

Solution:

According to Le Chatelier's principle when any system at equilibrium is subjected to change in concentration, temperature, volume, or pressure, then the system readjusts itself to (partially) counteract the effect of the applied change and a new equilibrium is established.

Hereof:

1. Increasing the pressure will shift the equilibrium of the reaction toward the product.
2. The constant injection of new portions of oxygen and ammonia will shift the balance right.
3. Use of distillation column to separate water from the reaction medium will contribute to a shift to the right of the reaction equilibrium.
4. Increasing of the temperature will speed up the reaction of oxidation of ammonia.