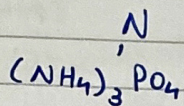


Fertilizers

↳ water soluble



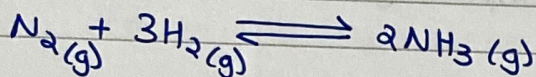
P

K



Haber's process → Manufacture of Ammonia gas

↓



Forward reaction: exothermic

Pressure: 200 atm

temp: 450°C

catalyst: Powdered Iron → Fe metal

High pressure is used since it would favor the forward reaction, since it would shift the equilibrium towards the side of less moles.

We can't have higher temperature as doing so will shift the equilibrium backwards, since increasing temperature favours endothermic reaction.

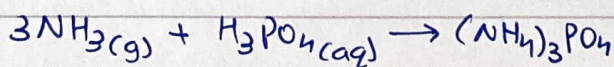
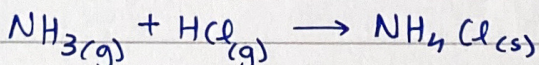
We can't use very low temperature since that would mean less kinetic energy.

450°C is a compromised temperature

Uses of ammonia

Using its basic properties → $\text{NH}_3(\text{g}) + \text{H}_2\text{O} \rightarrow \text{NH}_4\text{OH}(\text{aq}) \rightleftharpoons \text{NH}_4^+(\text{aq}) + \text{OH}^-(\text{aq})$
↳ ammonia is basic in nature

using it as a base → $\text{NH}_4\text{OH}(\text{aq}) + \text{HCl}(\text{aq}) \rightarrow \text{NH}_4\text{Cl}(\text{aq}) + \text{H}_2\text{O}(\text{l})$



When we add synthetic fertilisers eg. NH_4Cl , NH_4 comes from base NH_4OH , which is a weaker than the HCl which gives the Cl^- . Which is why when water is added, the HCl being more stronger than NH_4OH , the soil becomes added.

IF P is in excess, it would mix in with the water and promotes growth of Algae. This would decrease amount of Dissolved Oxygen.

Both CaO and CaCO_3 are used to neutralise acidic soil.

But CaCO_3 is more preferred as after reaction with the soil, the remaining CaCO_3 (white powder) gets washed away when it rains, since it is insoluble.

When we use CaO , after reaction with soil, the remaining CaO reacts with rain water to form Ca(OH)_2 . The OH^- ions make soil basic which then needs to be neutralised using acid.

This process would continuously need to be repeated, which is why it is not preferred.