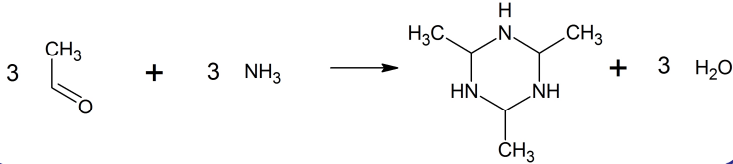
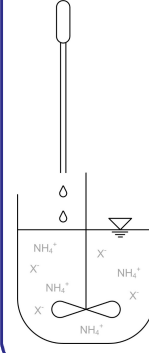


Scope of the research

- First principle determination of products of acetaldehyde-ammonia reaction at various pH
- Dependence of reaction products on acid type
- Possibility to adapt the reaction to pH requirements of the consecutive reactions



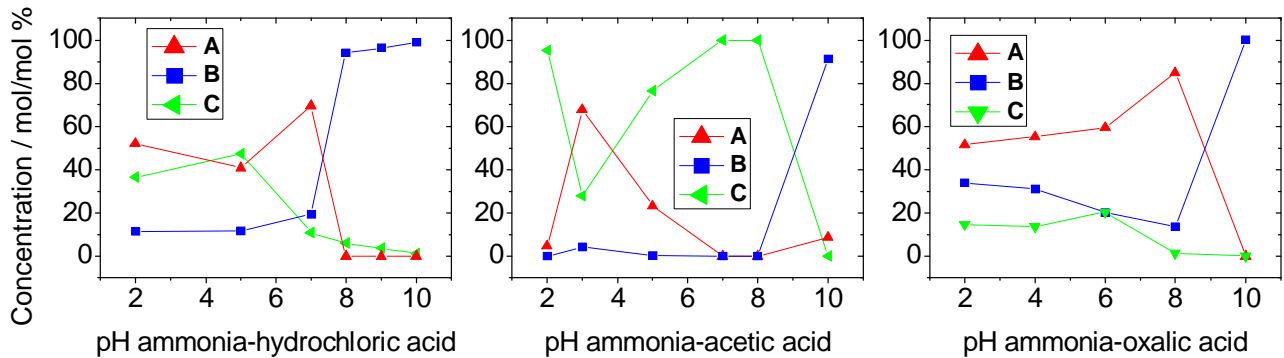
Experimental setup



- Continuously stirred and cooled reactor
- Reaction at RT and atmospheric pressure
- Slow addition of acetaldehyde to ammonium salt solution in excess of ammonia/acid
- 1:1 stoichiometric ratio acetaldehyde-ammonia.

Results

- Basic conditions:
 - In all acids trimer is formed quantitatively
- Neutral conditions:
 - Low concentration of trimer
 - In acetic acid 100 % polymer
 - In oxalic and hydrochloric acid predominant presence of unreacted acetaldehyde
- Acid conditions:
 - Acetic acid: prevalence of polymer
 - Oxalic acid: equal amounts of trimer and acetaldehyde, low polymer
 - Hydrochloric acid: equal amounts of polymer and acetaldehyde, low trimer



A = Acetaldehyde

B = AcH-NH₃ Trimer

C = Polymerisation products

Conclusions

- No influence of acid type at high pH
- Neutral pH does not allow trimer formation with every acid
- In large excess of acid, the acid structure plays a major role in stabilizing the trimer
- It is possible to avoid polymer formation and to preserve the carbon source in oxalic acid if low pH is required by following operations