CHAPTER 4

4. RESULTS AND DISCUSSION

4.1. Preparation of Melamine Sulfonate Formaldehyde (MSF) and Melamine Urea Sulfonate Formaldehyde (MUSF):

The MSF was prepared according to the four steps method. In this method the polymers were formed through (a) hydroxymethyltion of melamine by formaldehyde giving trimethylol melamine; (b) sulfonation of one methylol group of the product by sodium bisulfit giving sulfonated methylol melamine; (c) low pH condensation; (d) high pH rearrangement giving melamine formaldehyde sulfonate .

The MUSF was prepared by the same manner where the melamine molecule replaced by melamine/urea, (1/1) in the first step, then the sulfonation occurred in the second step. The product is undergoing low pH condensation and high pH rearrangement at the same vessel and conditions. According to this scheme.

$M + 3F = MF_x$ (ti, Ti and pHi) condensation (1)

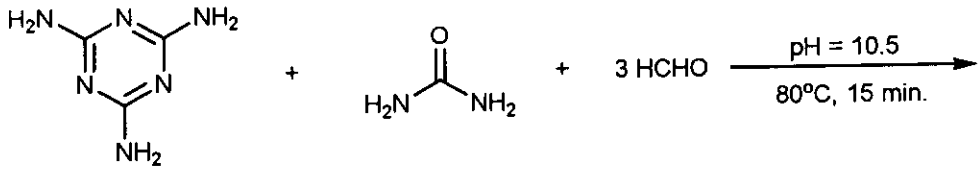
$MF_x + S = MF_xS$ (ti, Ti and pHi) sulfonation (2)

$MF_xS =$ pi MF_xS (ti, Ti and pHi) polymerization (3)

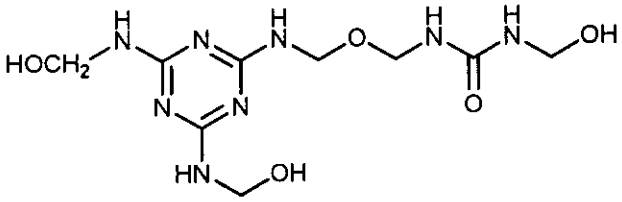
$MF_xS =$ pi MF_xS (ti, Ti and pHi) rearangment (4)

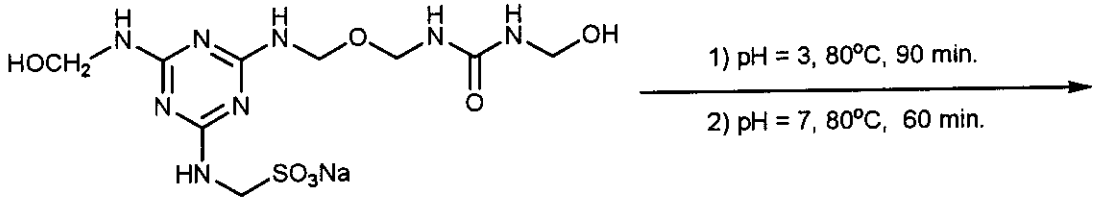
Where M = melamine, F = formaldehyde, S = sulfite group, MF_x = trimethylol melamine, MF_xS = sulfonated melamine formaldehyde, low-pH condensation intermediate resin, T_i = temperature of corresponding step, pH_i = pH of corresponding step, t_i = reaction time of corresponding step, x = 3.

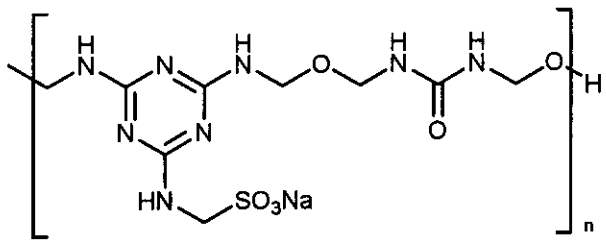
Reaction equation of MUSF:



Melamine



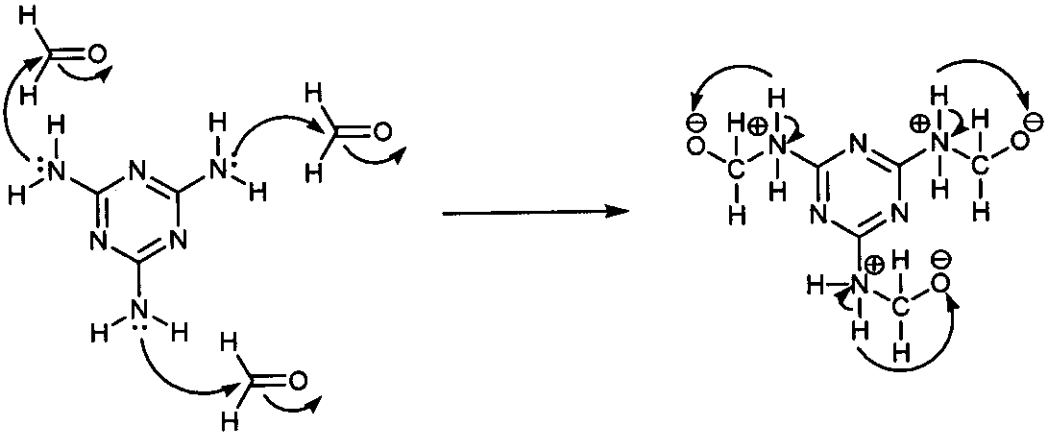


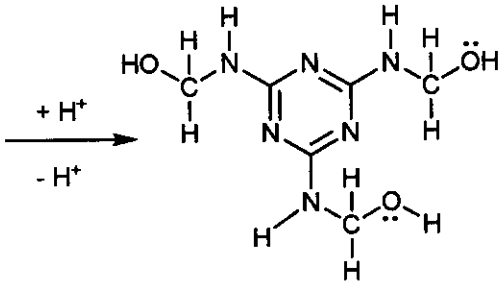


Melamine urea sulfonate formaldehyde (MUSF)

Reaction Mechanism

1)





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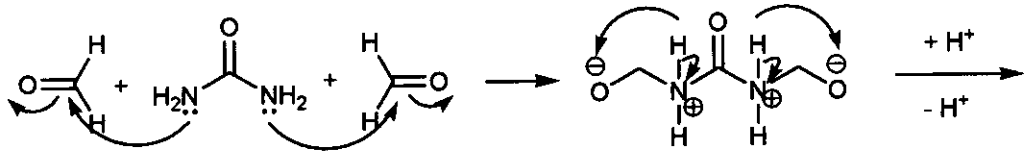

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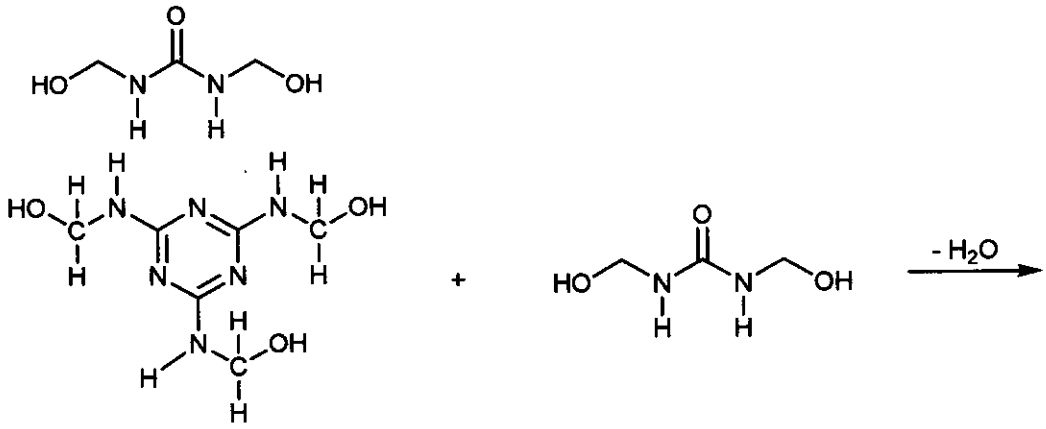

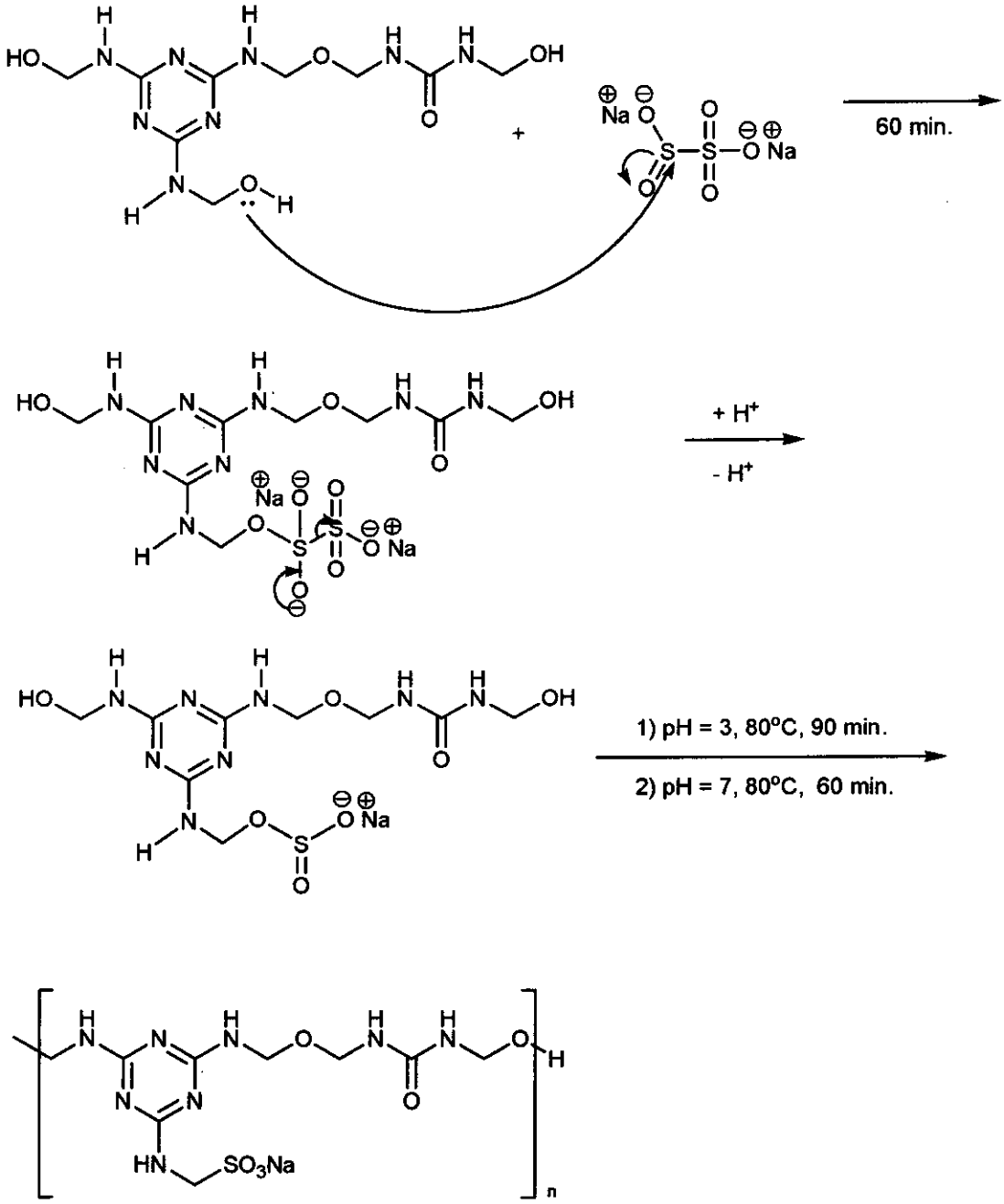

Melamine urea sulfonate formaldehyde (MUSF)