Influence of steam explosion pretreatment on the thermal degradation of cellulose fibers

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Background and Objectives

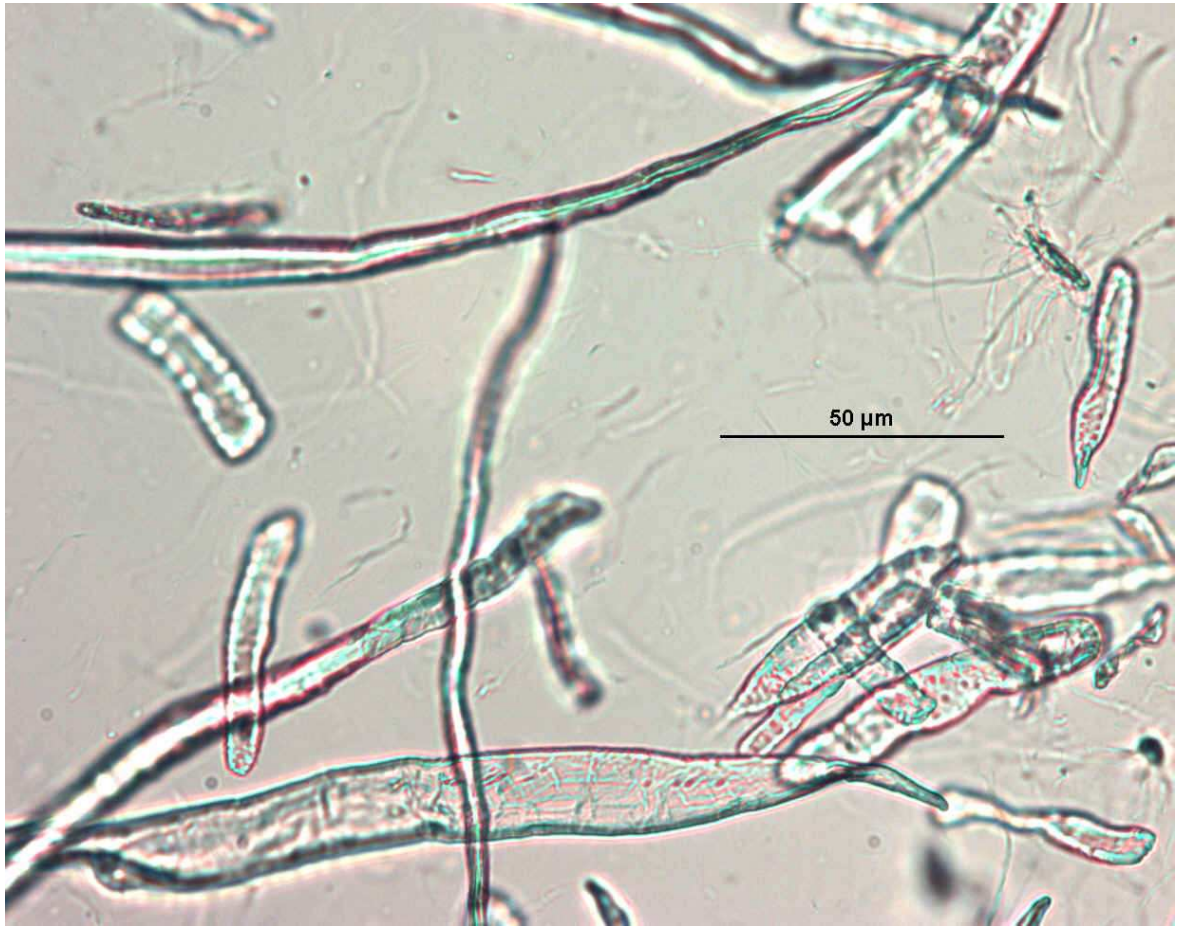
❖ The aim of the present study was:

1) to compare the effect of different steam explosion pretreatments on the thermal degradation of a bleached cellulose where components like hemicelluloses and lignin have already been removed by acid and alkalin treatments.

2) To identifie the concentration of degradation products (furfural and 5-hydroxymethylfurfural) in the liquor obtained after the pretreatment

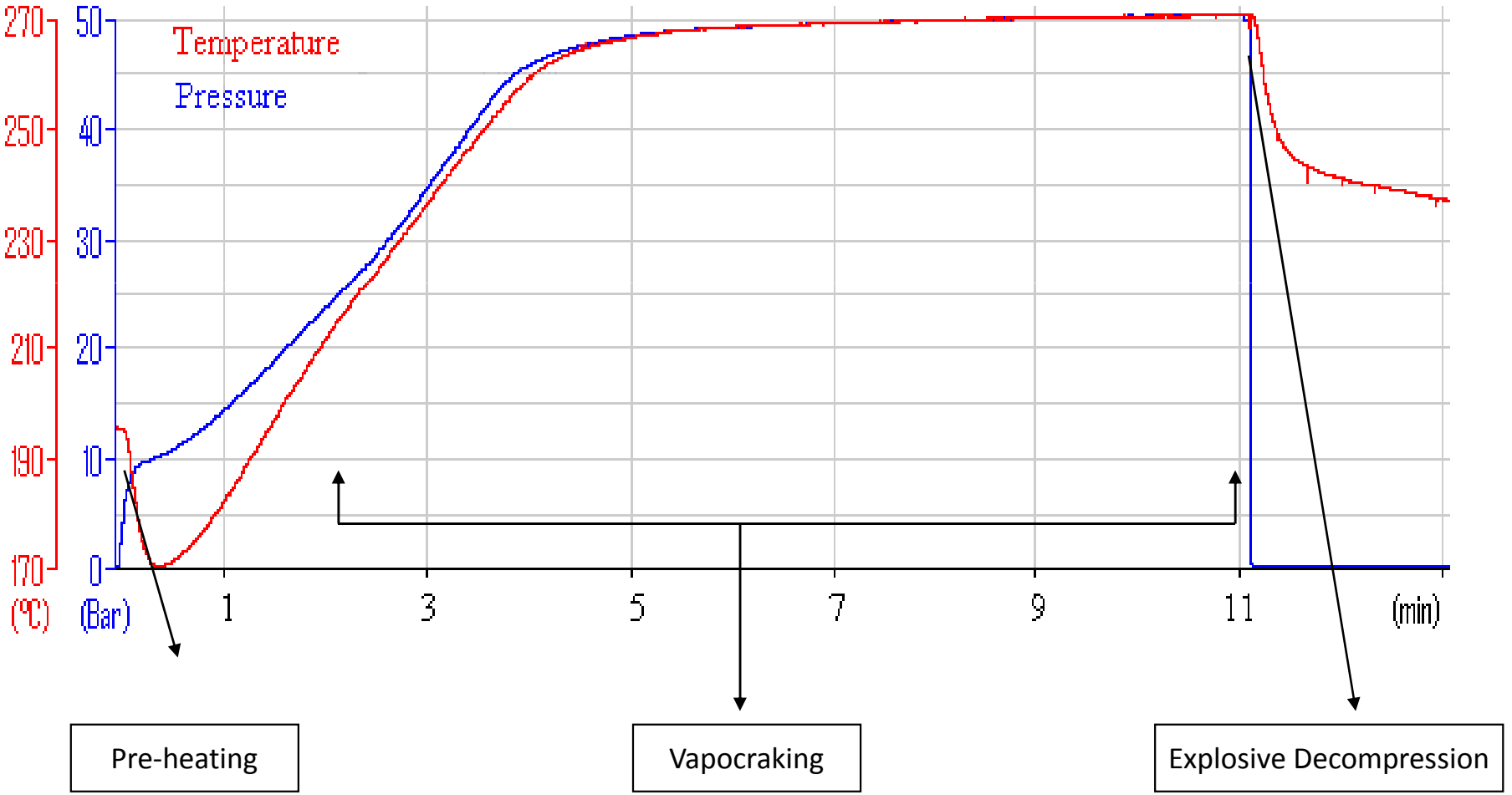
Materials and Methods

Material : *Microcrystalline cellulose (Alba-fibre C-200).*



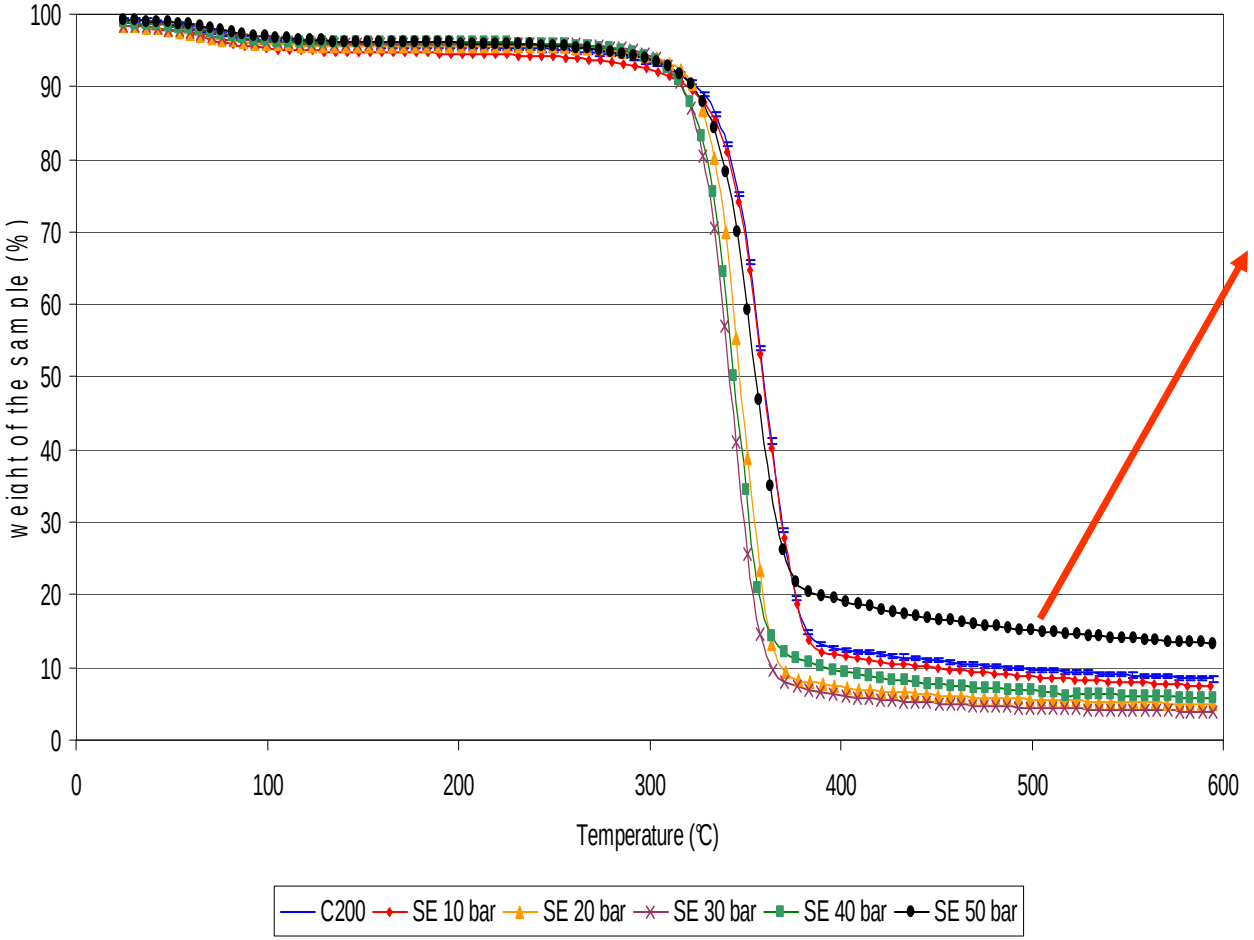
Materials and Methods

Steam Explosion process



Results

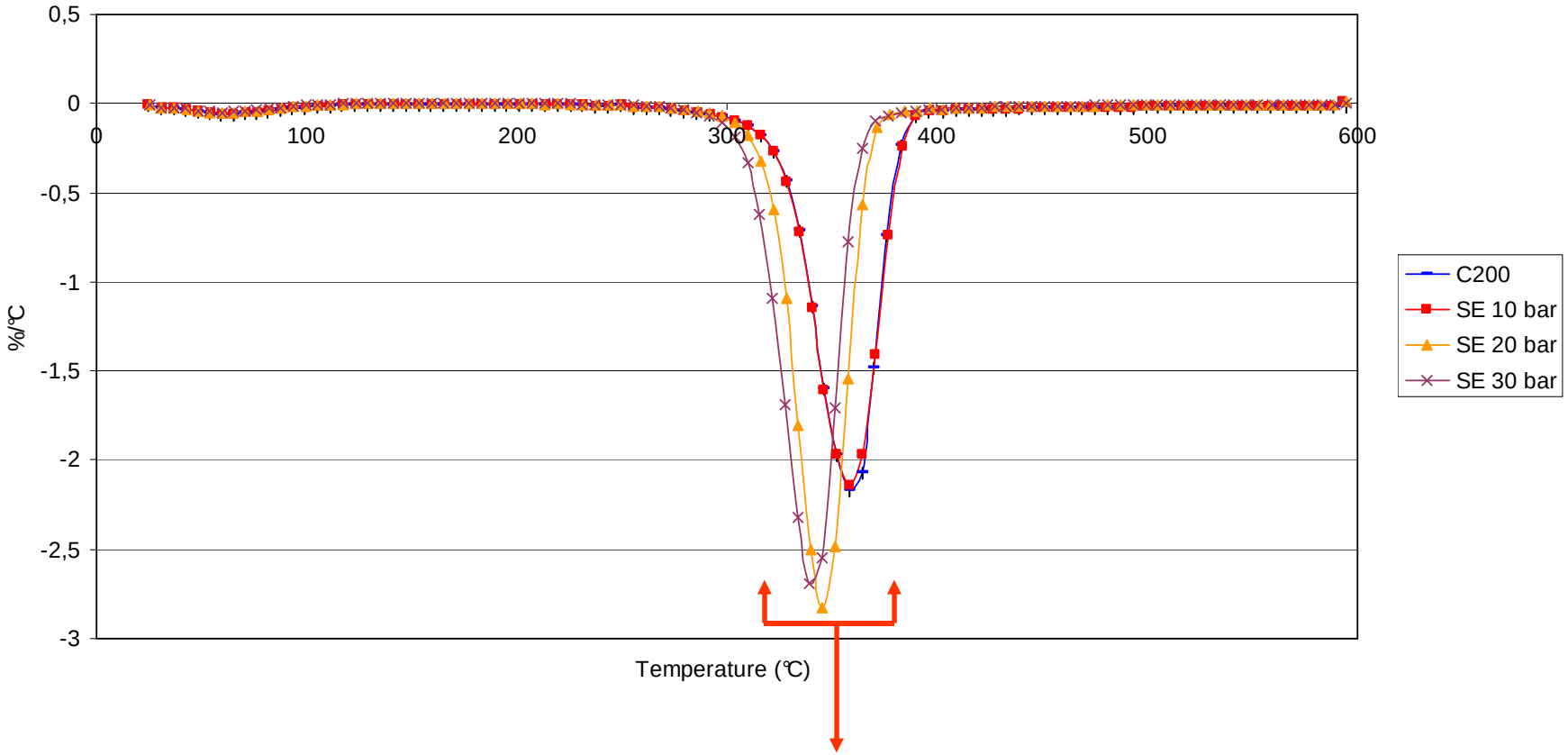
TGA of solid phase



Increase of carbonaceous residues at the end of the pyrolysis (char) for the SE 50 bar samples (14%) compared to the others samples (5 to 9 %)

Results

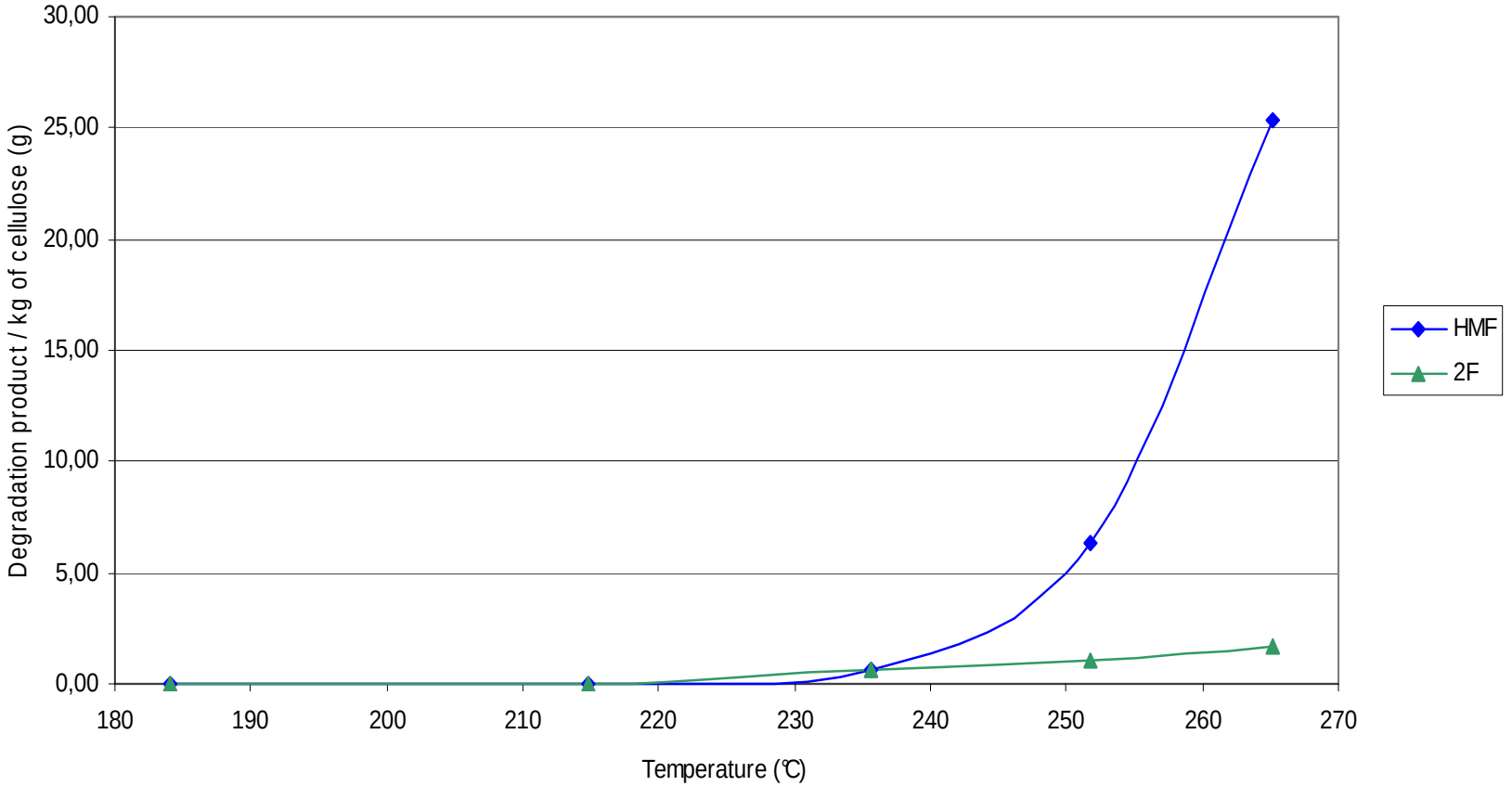
dTGA of solid phase



Temperature of the degradation peaks of cellulose decrease with the intensity of the pretreatement process

Results

HMF and 2F concentration in steam explosion liquors



Increase of HMF and 2F concentration in the liquor obtained at temperatures higher than 240°C

Conclusions

- Critical temperature : 240 - 250 °C
  - Important Thermal Degradation
  - Strong increasing of degradation product
- Decrease of thermal stability of non-degraded steam explosion cellulose samples

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Thank you !