

*

(/ / : // :)

Archive of SID

FTIR

)

HPSEC

¹³C NMR

(

HPSEC ¹³C NMR FTIR

:

...

()

¹³C FTIR

()

NMR

()

()

()

(/ V/V)

/

¹³C NMR FTIR

()

pH

(HPSEC)

()

Archive of SID

()

()

(MWL)

(CEL)

()

()

High Pressure Size Exclusion Chromatograph

NMR

(HPSEC)

FTIR

Bruker

cm⁻¹

cm⁻¹ ()

¹³C NMR

°C d6 -

Bruker 400 MHz MDX NMR

/

¹³C NMR °C

ppm ()

(HPSEC)

Agilent 1100

) PLGEL

(°C

THF

ml/min

(RI)

/

THF (V/V /) /

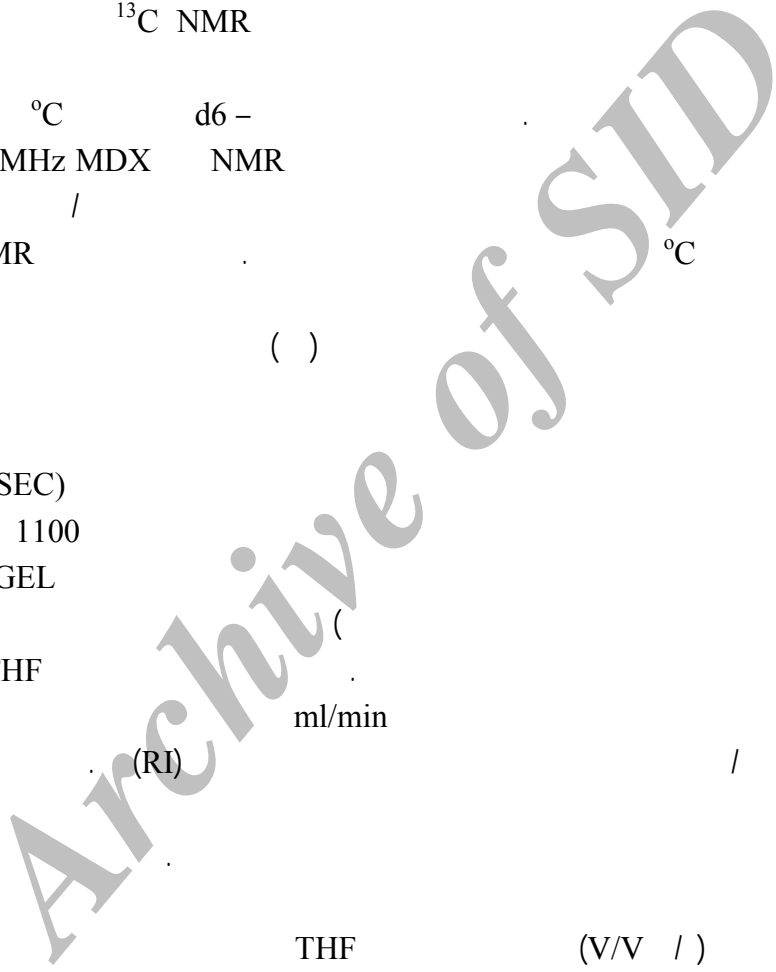
Gellerstedt

()

/

:

¹³C FTIR



°C

THF

(Steam Explosion)

()

(V/V /) /

()

THF

)

(

FTIR

°C

	()	(°C)

FTIR

FTIR

()

cm⁻¹

cm⁻¹

O-H

cm⁻¹

()

OH

cm⁻¹ ()

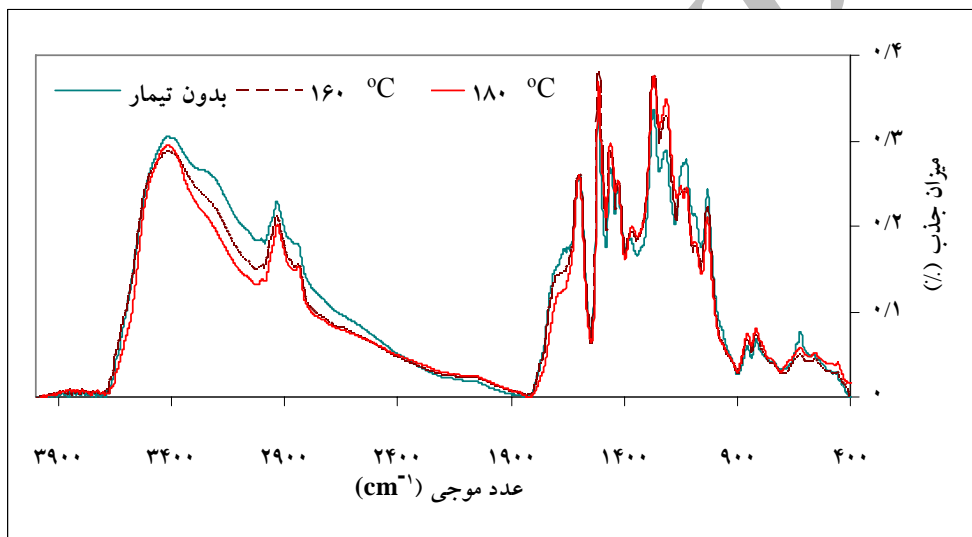
β

cm⁻¹

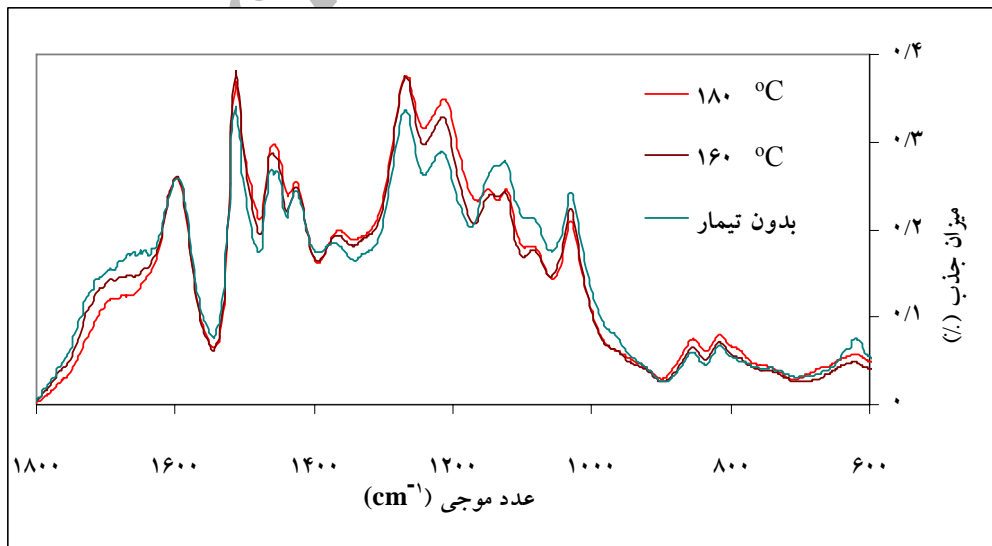
β-O-4

β -O-4
 cm^{-1}

FTIR



(cm^{-1}) FTIR



(cm^{-1}) FTIR

()

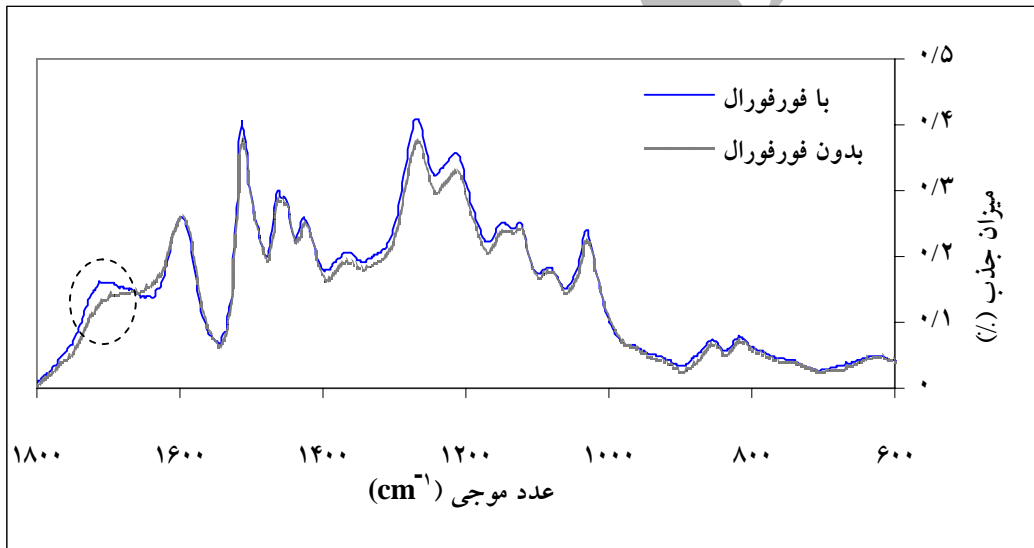
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FTIR

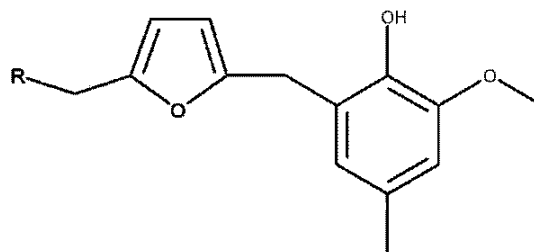
()

FTIR

cm⁻¹



Alc °C



() H

R

FTIR β -O-4' ^{13}C NMR ppm ^{13}C NMR $^{\circ}\text{C}$

() ^{13}C NMR ()

(/) / /

$^{\circ}\text{C}$	^{13}C NMR		
C_6	C_6		(ppm)
/	/		
/	/	β -O-4'	
/	/	()	
/	/		
/	/		
/	/	()	
/	/		

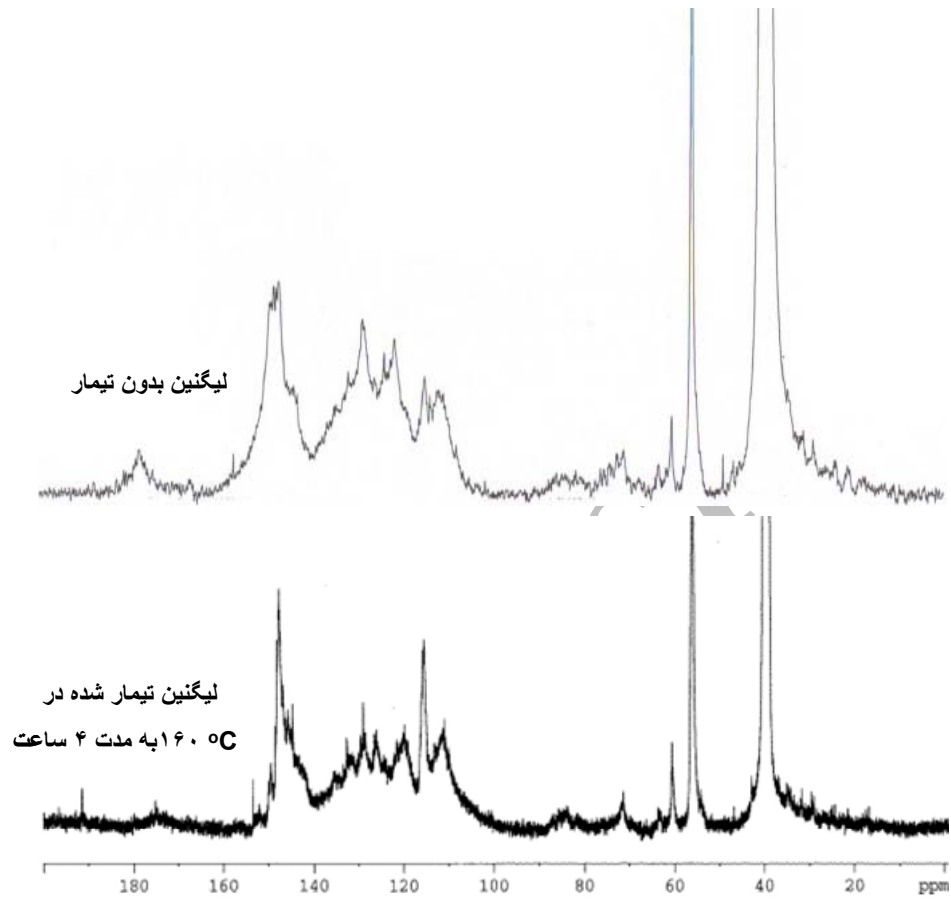
Archive of SID

β -O-4' / /

α -O-4' / .

(ppm)

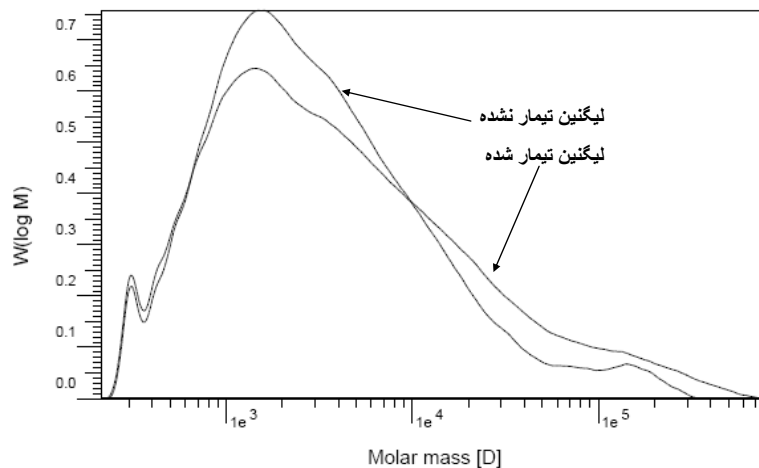
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(°C:)

¹³C NMR

¹³C NMR FTIR



(°C :)

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Lignin modifications in hydro-thermal treatment conditions

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Abstract

Heat treatment of wood causes a number of chemical and physical changes in the wood. Usually these changes have been studied on massive wood. Under this conditions, the overlapping of lignin and carbohydrates structural changes results in incomplete interpretation of changes in the main constituents of wood. To elucidate the modifications of lignin, in this study the pure lignin was treated under hydro-thermal treatment conditions of wood and its modifications were analyzed by means of FTIR, ¹³C NMR and HPSEC. The results showed that the cleavage of etherified bonds increased number of free phenolic groups. This resulted in activation of lignin and led to more condensed structure of lignin. Consequently, the solubility of lignin decreased in organic solvents and its molar mass distribution increased. The results indicated that the some carbohydrates derivatives such as furfural participated in the condensation reaction of lignin.

Keywords: Wood, Thermal treatment, Lignin, FTIR, ¹³C NMR, HPSEC, Furfural