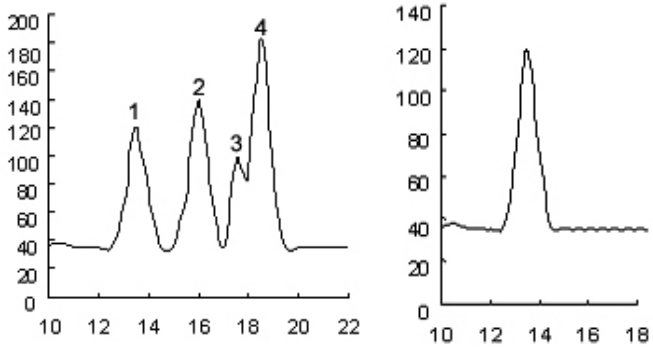
Supporting Information Available

1. HPLC analysis of oat β-glucan hydrolysate.

10.0 mg purified oat β-glucan was hydrolyzed at 100 °C for 5 h with 2 mL 1mol/L sulfuric acid in nitrogen atmosphere. The hydrolysate was neutralized with saturated $Ba(OH)_2$ and heated to boil, then keep stationary for 24 h so as to filter the $BaSO_4$ crystal. Deionized water was used to wash the crystal for several times and combined with the filtrate. The combined solution was lyophilized and dissolved in 2 mL deionized water for HPLC analysis.

The hydrolysate was analyzed using Waters HPLC system (Sugar Pak I column, 300×6.5 mm ID, Waters). Double distilled water was used as mobile phase at a rate of 0.4mL/min. Column temperature was 85 °C. A RI detector was used to detect the monosaccharide. Glucose, mannose, galactose, and xylose were used as standard. 10 μL standard and 25 μL sample were injected into the system. The HPLC chromatogram of standard monosaccharides and oat β-glucan hydrolysate was shown in Figure1. The peak in Figure1(a) at 13.5min, 17.0min, 18.5min, and 19.0min represents Glc, Man, Gal and Xyl respectively. The peak in Figure1(b) at 13.5min represents oat β-glucan hydrolysate. So it is easy to draw a conclusion that oat β-glucan was composed of glucose.



(a) (b)

Figure 1. HPLC chromatogram of standard monosaccharides (a) 1-Glc, 2-Man, 3-Gal, 4-Xyl, and (b) oat β-glucan hydrolysate.

2. Infrared analysis of oat β-glucan

Oat β-glucan was mixed with KBr and pressed to pellet, then scanned on a Nexus 670 FT IR spectrometer (Nicolet, Madison, WI). The spectra were recorded covering a range of 4000-400 cm^{-1}. The wavenumber and corresponding structure is shown in Table1. The IR spectrum is shown in Figure 2.

Table 1. IR absorption and molecular structure of oat β-glucan

Wavenumber, cm^{-1}	Assignment	Vibrational mode
3500-3100	O-H, C-H in carbohydrate	Stretching vibration
3000-2800	C-H in carbohydrate	Stretching vibration
1400-1200	C-H in carbohydrate	Bending vibration
1200-1000	C-O-C, O-H in pyranose	
894	β-D-pyranoglucose	

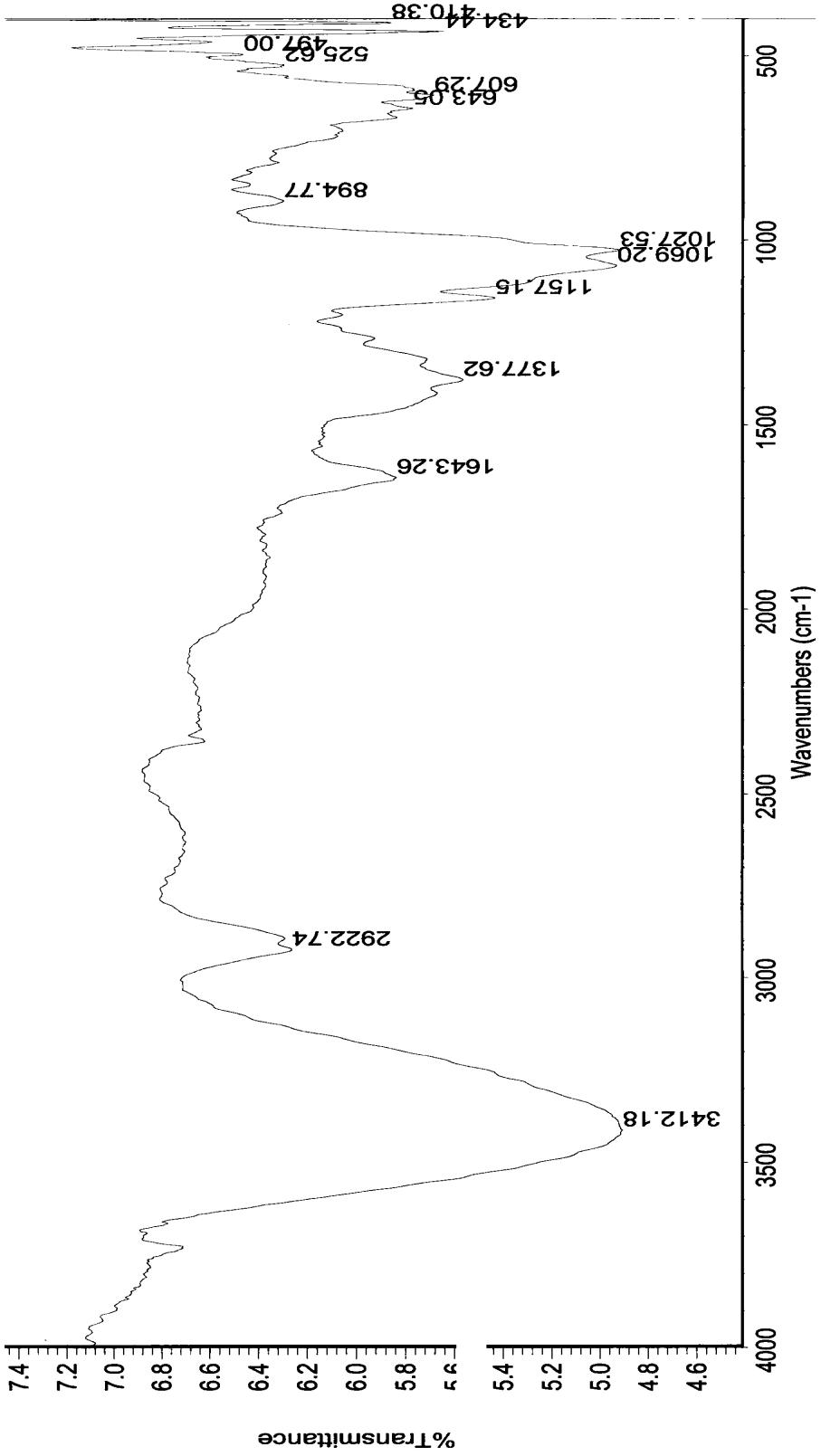


Figure 2. IR spectrum of oat β-glucan

3. ^{1}H NMR and ^{13}C NMR analysis of oat β-glucan

Oat β-glucan was dissolved in D_2O and transferred to 5 mL sample tube, then assayed on Bruker DMX-500 NMR spectrometer, ^{1}H NMR spectrum was obtain at 500 MHz and ^{13}C NMR spectrum was obtained at 125 MHz. Characteristic chemical shift signals of polysaccharide mainly centralize around δ 3.3-3.5 ppm. Signals between δ 3.5-4.5 ppm correspond to proton shift of sugar ring. The resonance signals of ^{1}H connected to anomeric carbon in α-glycoside generally move to lower field by δ 0.3-0.5 ppm compared to that of ^{1}H in β-glycoside. Chemical shifts of α-glycoside often appear at 4.8-5.3 ppm while those of β-glycoside often appear at δ 4.4-4.8 ppm. As shown in Figure3, the signals in ^{1}H NMR of oat β-glucan only appear below δ 5.0 ppm, which indicates only β-glycoside exists in purified sample.

Characteristic shift signals of ^{13}C NMR of oat β-glucan and the corresponding carbon assignment are shown in Table 2 with the referenced molecular model in Figure 4. It's clearly shown in Figure 5 that there is only one resonance signal in the range of 99-110 ppm, indicating that the oat β-glucan was composed of only one type of monosaccharide. The ratio of β-(1→4) glycoside bond to β-(1→3) glycoside bond can be measured from the ratio of the intensity of chemical shift of C-3 in (b) glycosyl to that of C-4 in (a), (b) and (d) glycosyl. The resulted ratio of β-(1→4) glycoside bond to β-(1→3) glycoside bond is approximately 2.1**:**1, which is similar to the results from other researches.

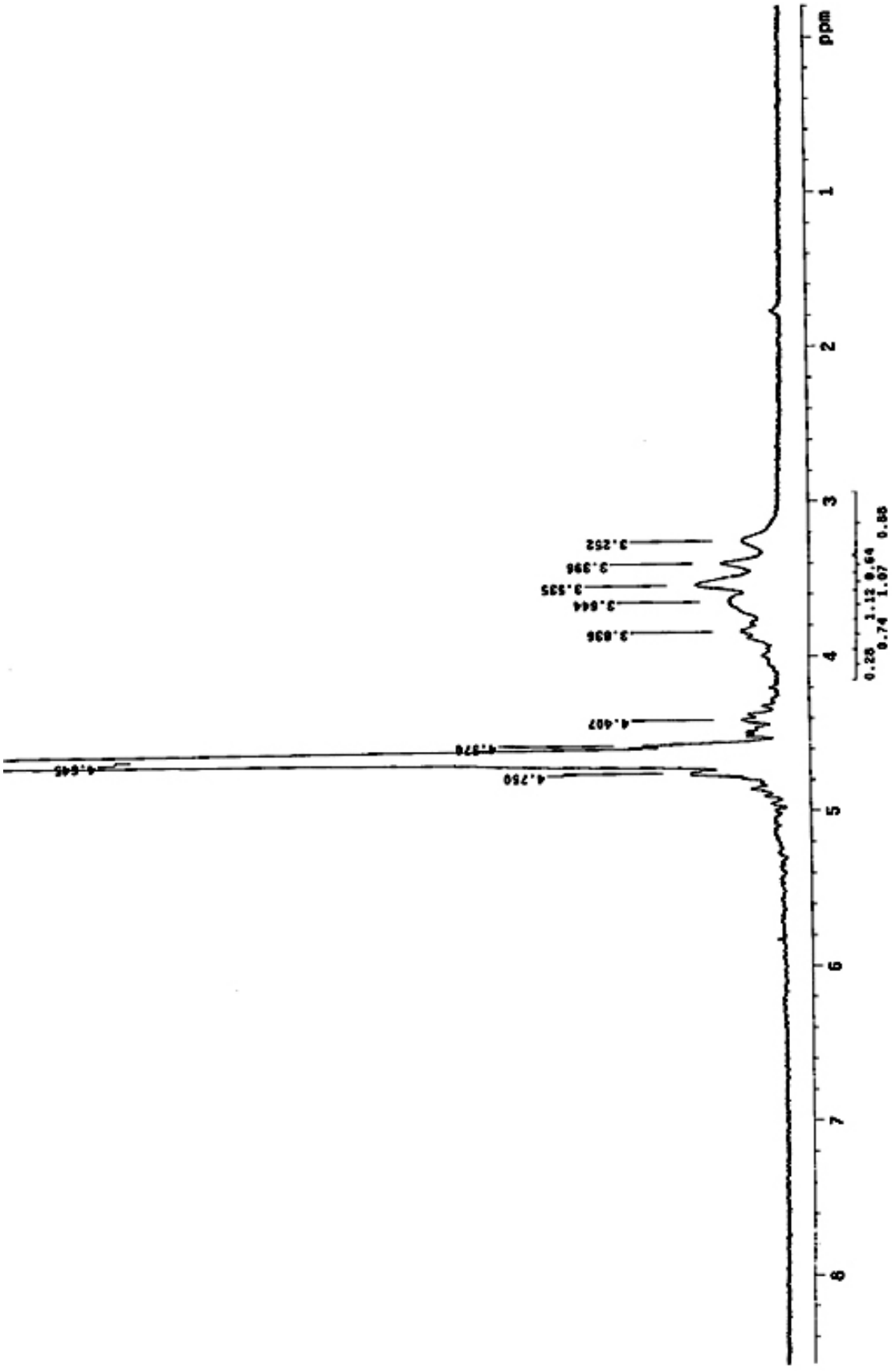


Figure 3. ^{1}H NMR spectrum of oat β-glucan

Table 2. Characteristic shift signals of ^{13}C NMR of oat β-glucan

Chemical shift (ppm)	Carbon assignment
103.9	C-1 of (c) glycosyl
89.69	C-3 of (b) glycosyl
79.18	C-4 of (a), (c) and (d) glycosyl
77.84	C-5 of (b) glycosyl
75.72	C-3 of (a), (c) and (d) glycosyl
74.18	C-5 of (a), (c) and (d) glycosyl
69.45	C-4 of (b) glycosyl
61.74	C-6 of (b) glycosyl
60.85	C-6 of (a), (c) and (d) glycosyl

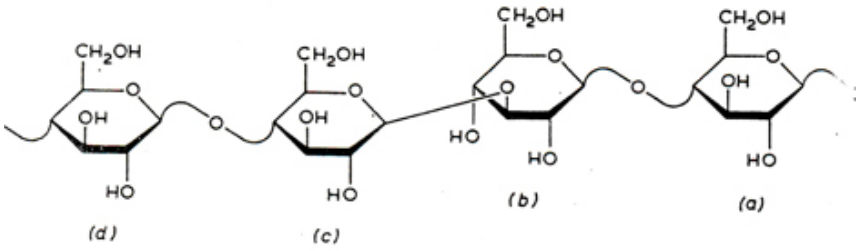


Figure 4. The simulated chart of molecule structure of oat β-glucan

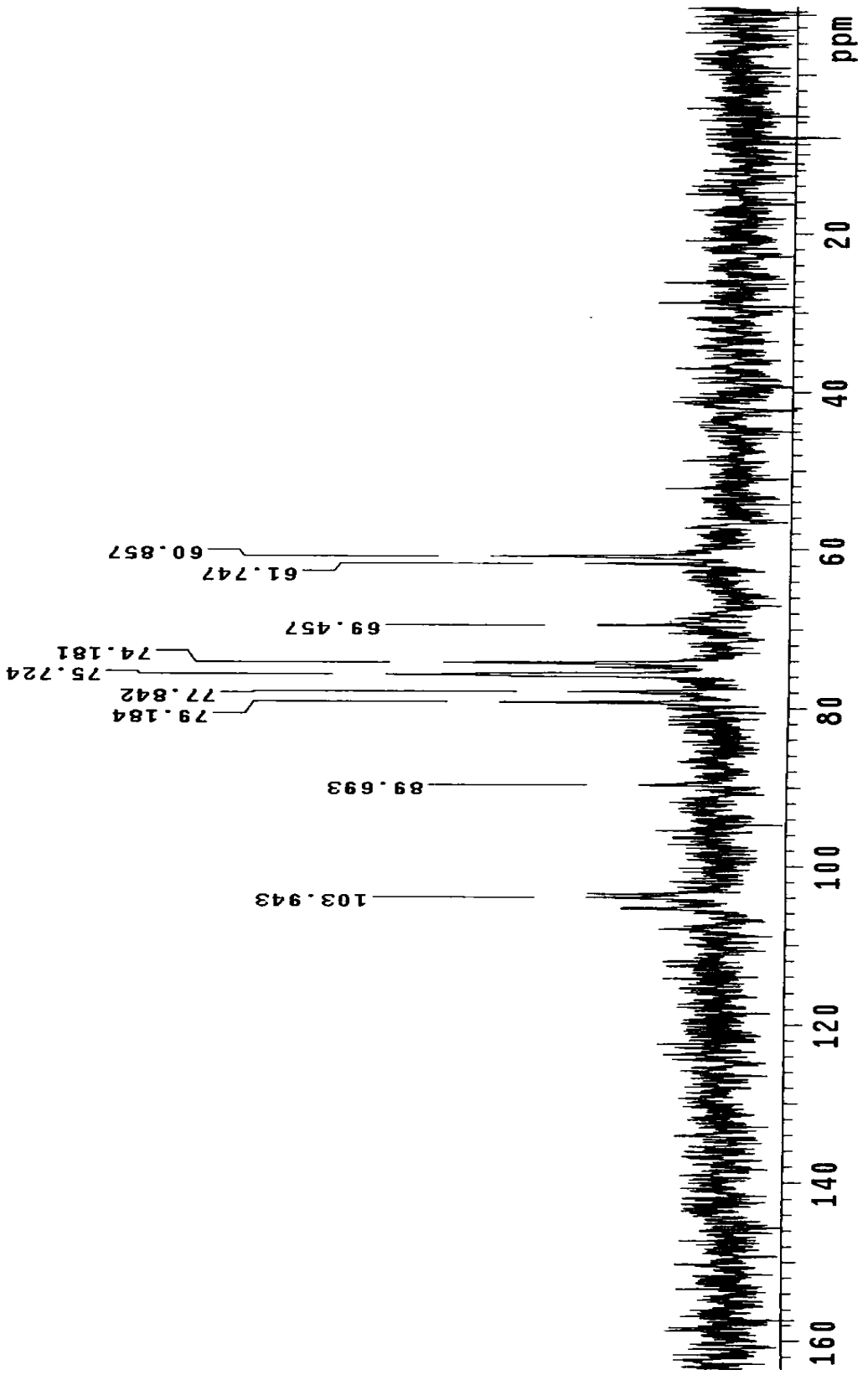


Figure 5. ^{13}C NMR spectrum of oat β-glucan