Supporting Information

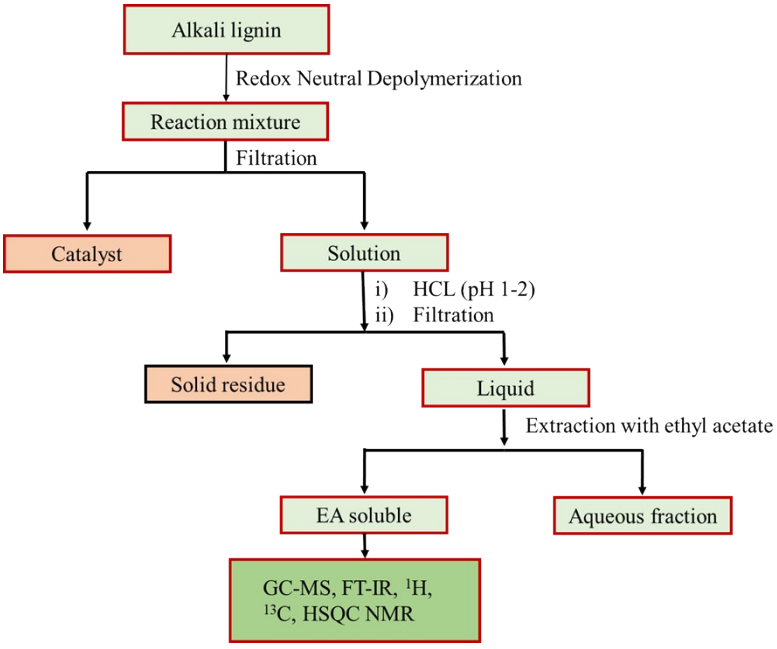
A Silica-Supported Palladium Oxide Catalyst (PdO@MCM-41) Selectively Cleaves Ether Linkages in Lignin Model Compounds and Alkali Lignin via Intramolecular Hydrogen Transfer

The entire process of the product separation is shown in scheme S1. The product identification of bio-oil was then analyzed with GC–MS, GC-FID and FTIR. Lignin conversion (>80%) and bio-oil yield (76%) were obtained as following:

$$Lignin\ conversion\ (wt\%) = \frac{m(Lignin_{applied}) - m(Lignin_{THF-washed\ filter\ cake})}{m(Lignin_{applied})} \times 100 \quad (1)$$

$$Bio\ oil\ yield\ (wt\%) = \frac{mbio\ oil}{m(Lignin_{applied})} \times 100 \quad (2)$$

$$Monomer\ yield\ (wt\%) = \frac{m(monomers)}{m(Lignin_{applied})} \times 100 \quad (3)$$



Scheme S1. Seperation sequence for product isolation and lignin recovery

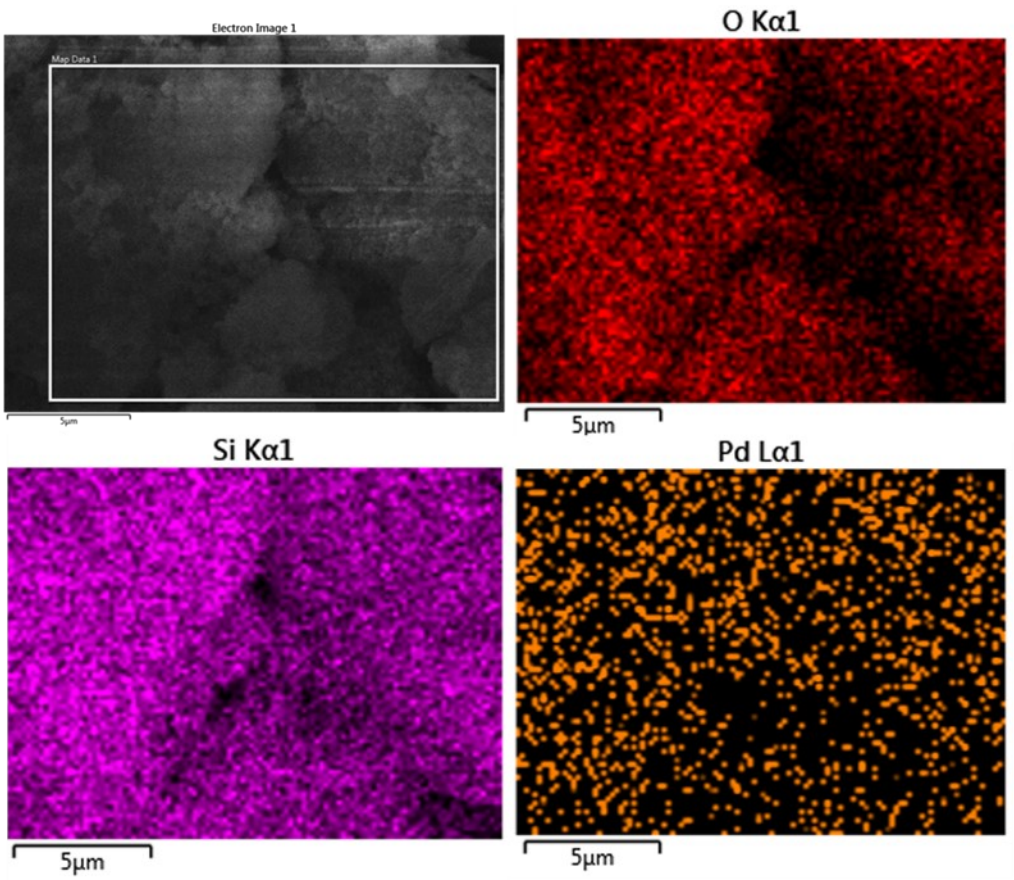


Figure S1. EDX elemental mapping of PdO@MCM-41

Table S1. ICP analysis of catalyst for redox neutral cleavage of 2-phenoxy-1-phenylethanol(PP-ol)

Solution Label	Pd (ppm)	Pd (mg/Kg)	Wt. %
Fresh catalyst	176	176	1.7
Used catalyst	146	146	1.4

Table S2. Surface area and pore size/volume distribution of MCM-41 and PdO@MCM-41

Sample	Surface area(m^2/g)	Pore size(nm)	Pore volume(cm^3/g)
MCM-41	255	2.3	0.46
PdO@MCM-41	184	2.6	0.36

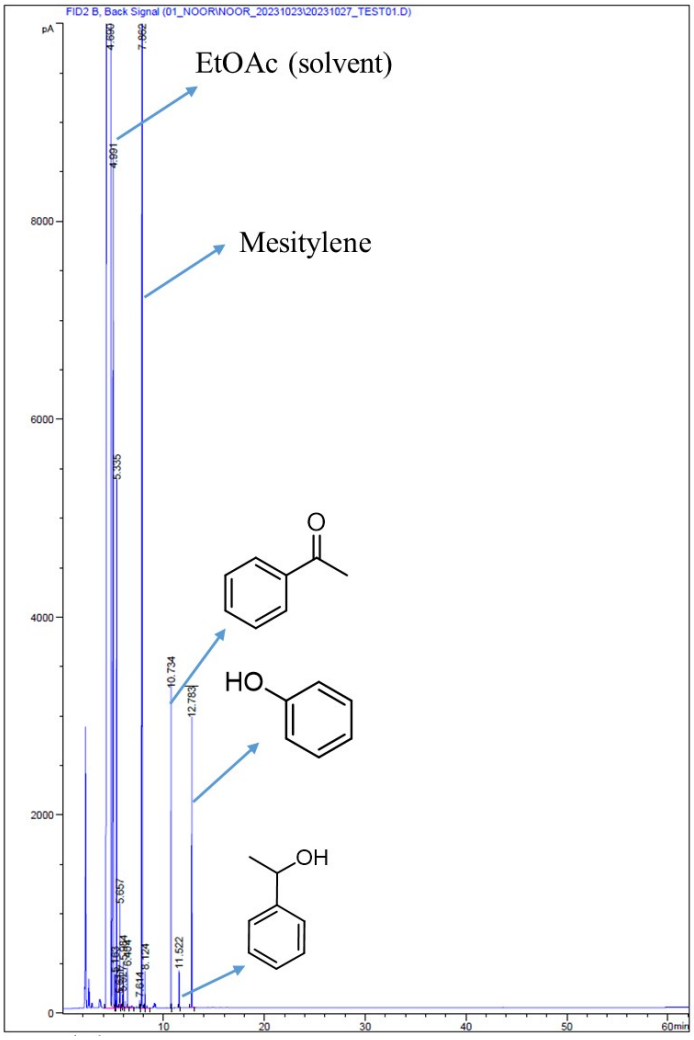


Figure S2. GC-FID chromatogram of redox neutral C-O bond cleavage in 2-phenoxy-1-phenyl ethanol using PdO@MCM-41 catalyst

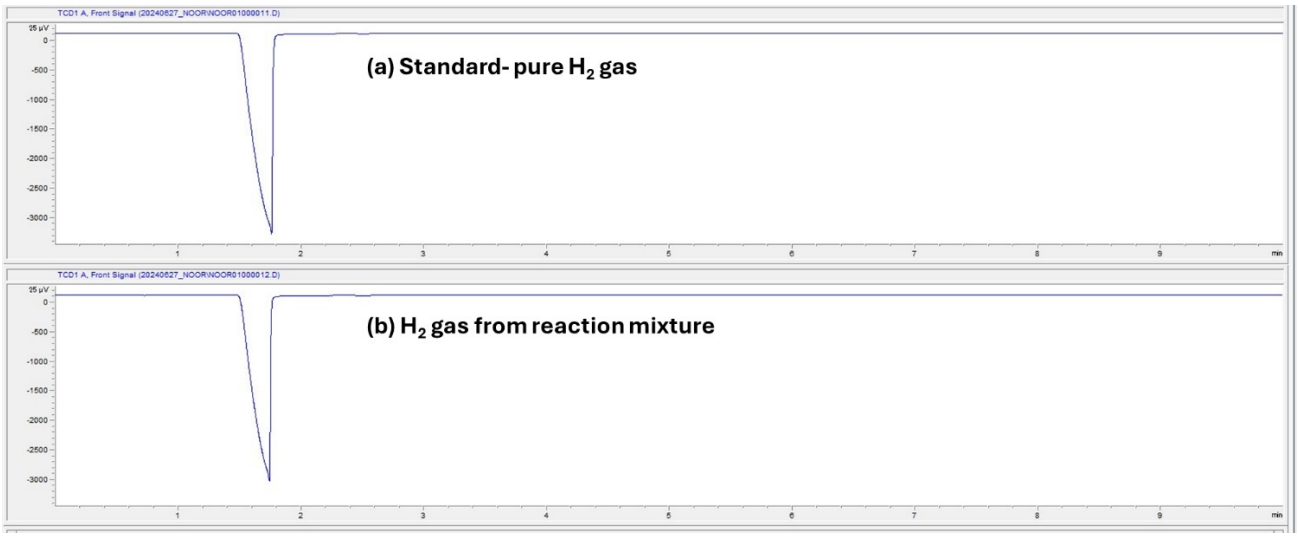


Figure S3. Detection of evolved hydrogen by PP-ol using GC-TCD a) chromatogram of pure H_2 sample, b) chromatogram of H_2 gas from reaction mixture. (*The peak is inverted due to the use of helium as carrier gas whose thermal conductivity is close to that of hydrogen*).

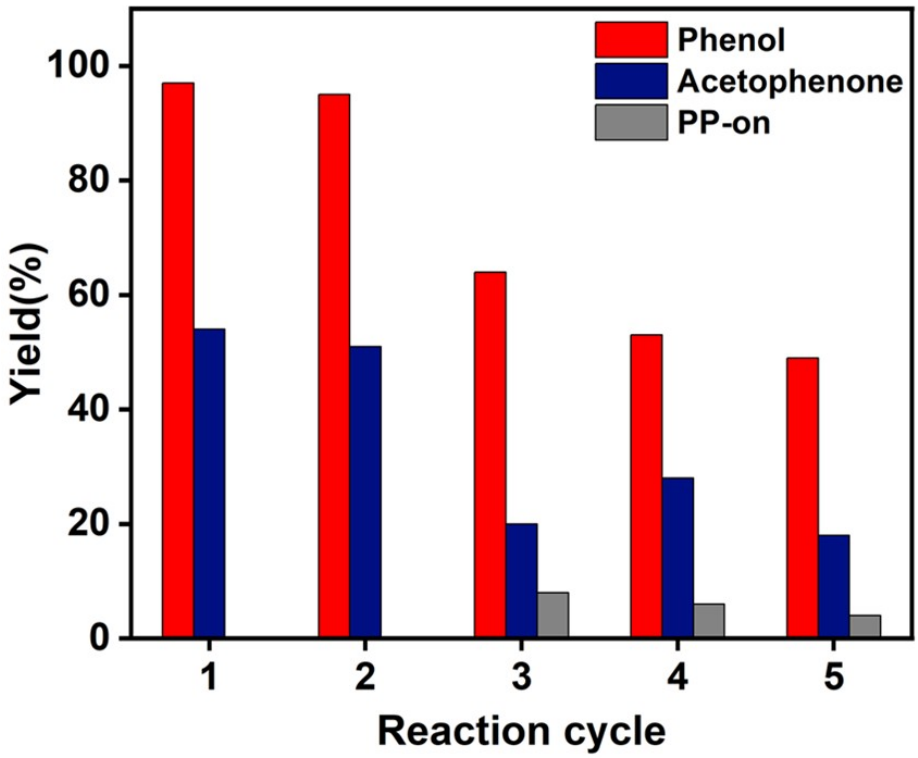


Figure S4. Recyclability of PdO@MCM-41 for redox neutral cleavage of 2-phenoxy-1-phenylethanol under optimized reaction conditions.

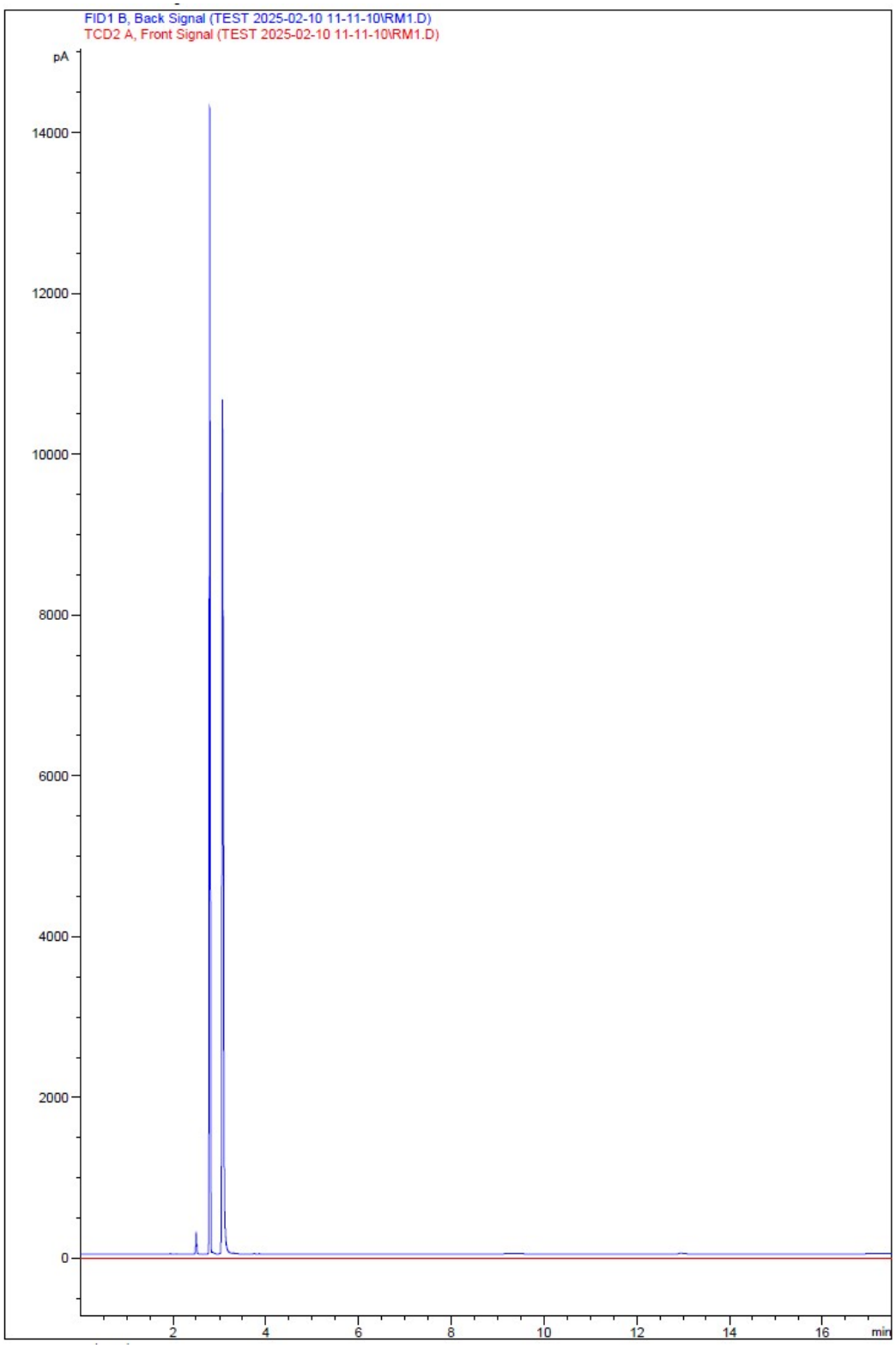


Figure S5. GC-FID chromatogram of redox neutral C-O bond cleavage in 2-phenoxy-1-phenyl ethanol using leached Pd

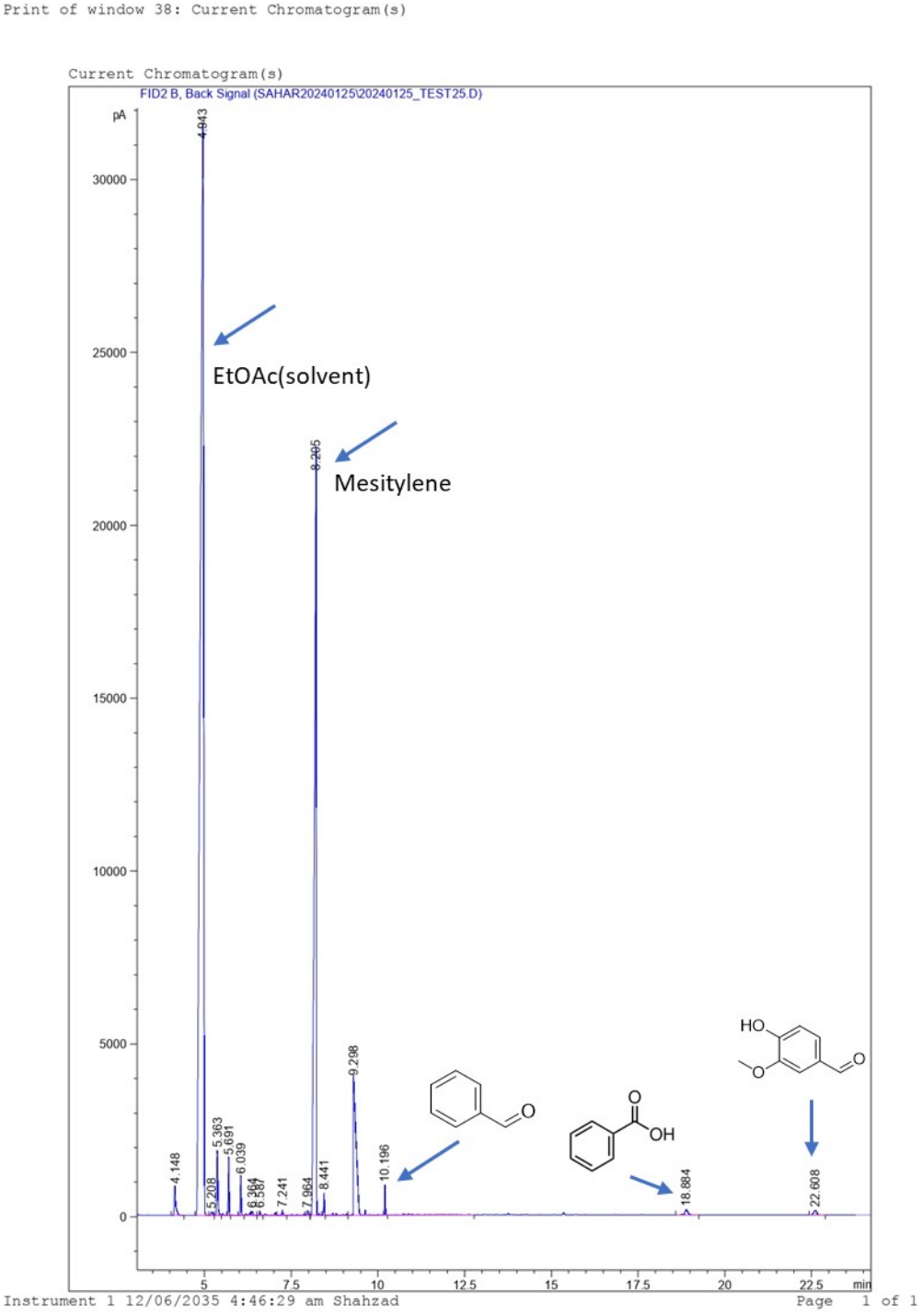


Figure S6. GC-FID chromatogram after depolymerization of alkali lignin.

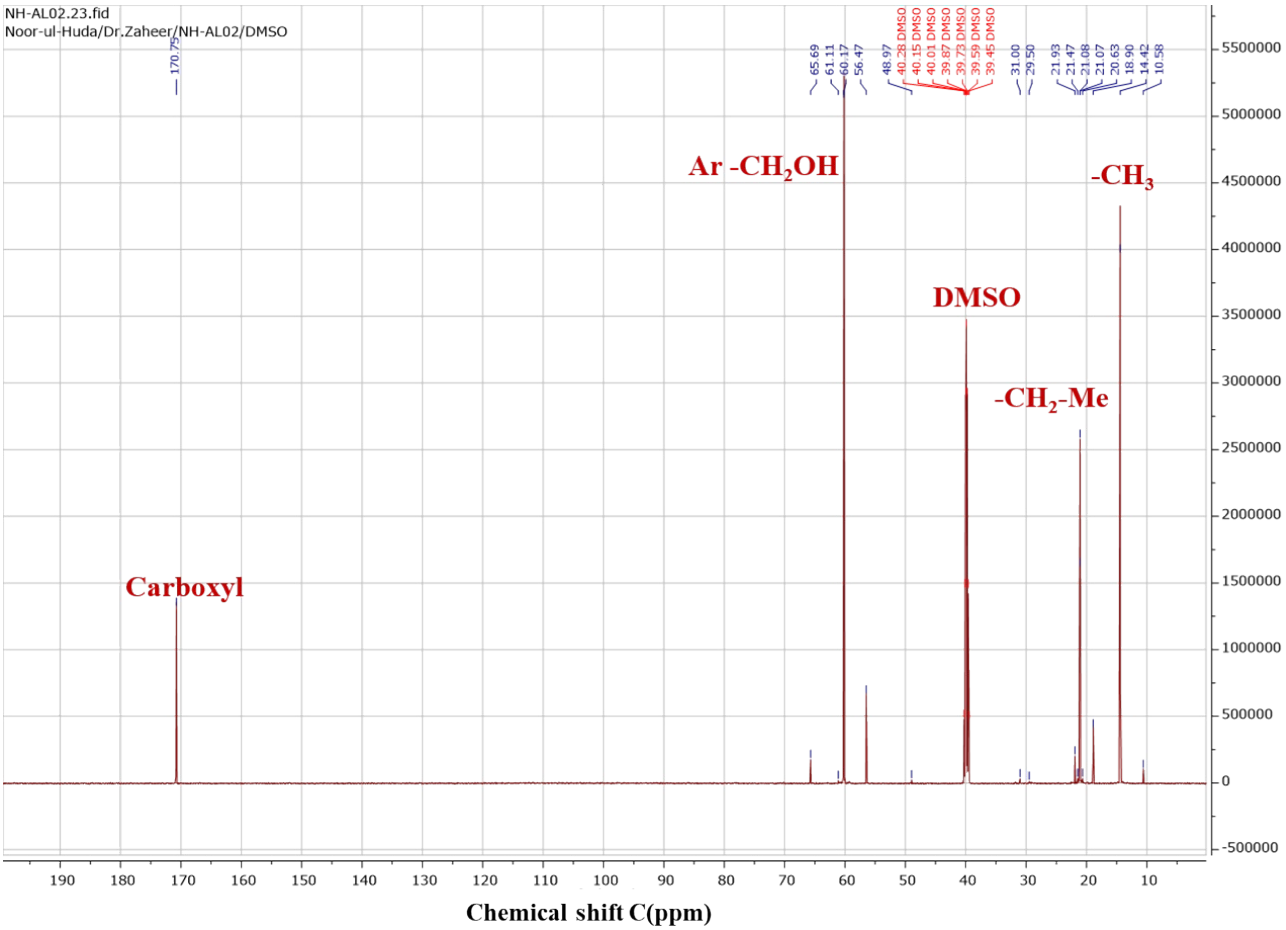


Figure S7. 13C NMR of depolymerized alkali lignin.