

## Supporting Information

### **Synergistic Catalysis and Deactivation Analysis of Ru/ZnO/C in Hydrogen-Transfer Reductive Catalytic Fractionation of Poplar Wood**

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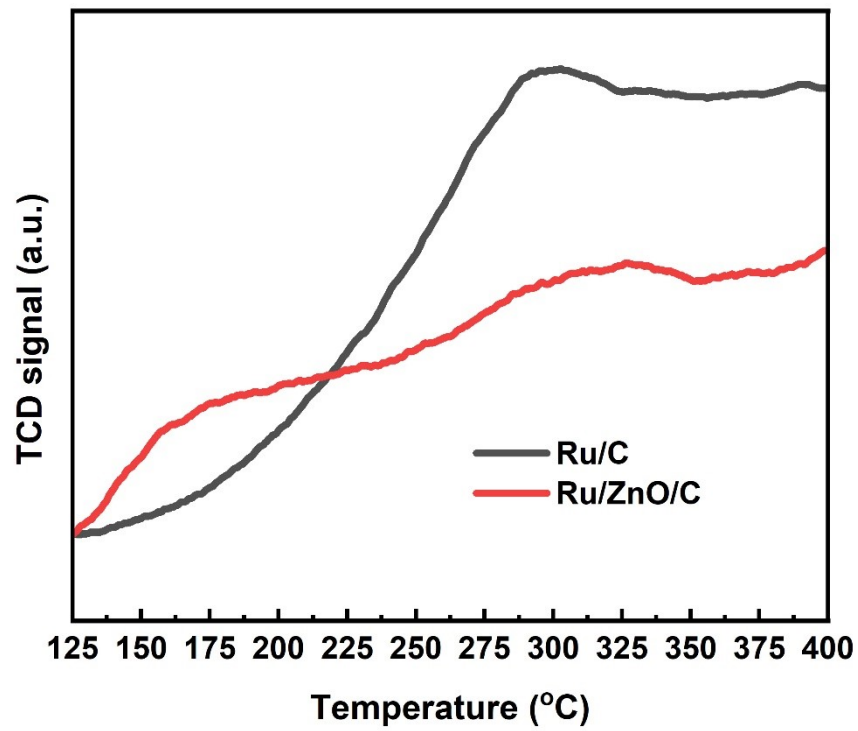


Figure S1. NH<sub>3</sub>-TPD profiles of 1% Ru/C and 1% Ru/ZnO/C catalysts

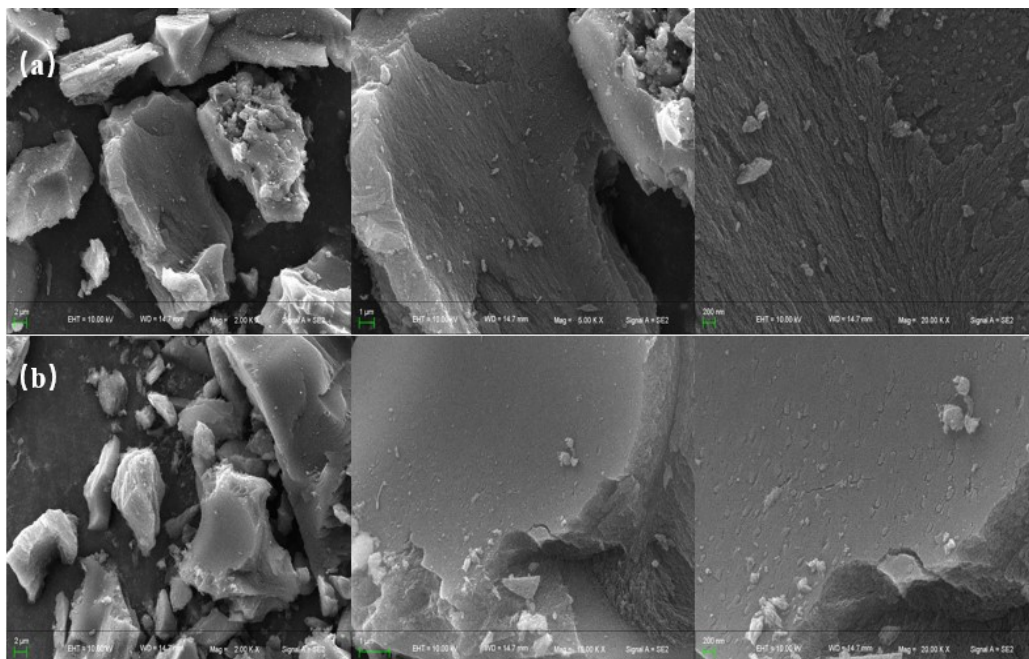


Figure S2. Scanning electron microscope images of (a) 1% Ru/C and (b) 1% Ru/ZnO/C catalysts

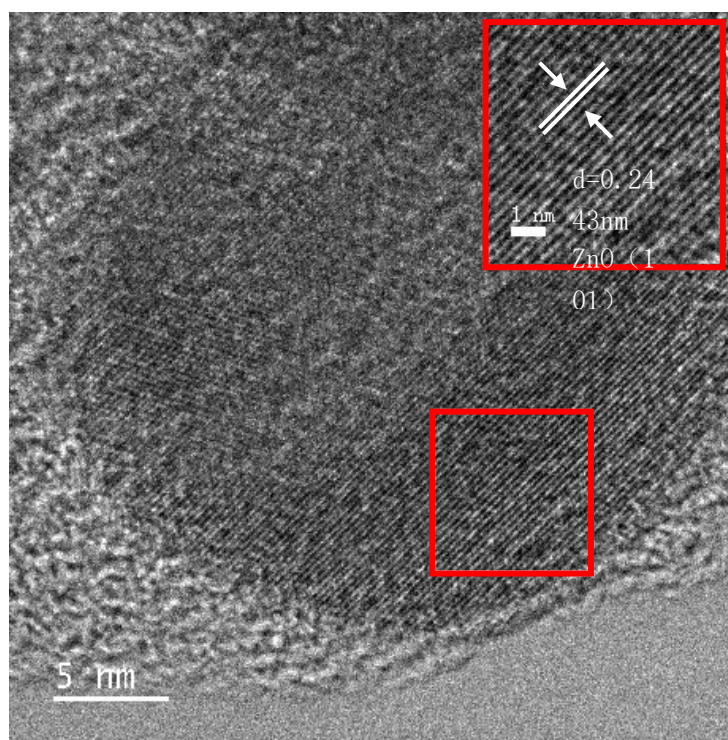
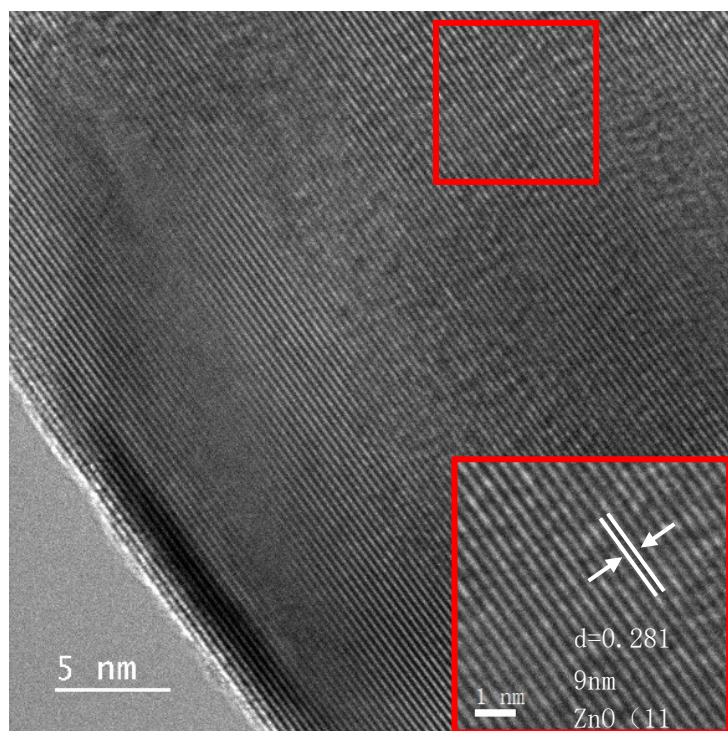


Figure S3. High-resolution transmission electron microscope image of Ru/ZnO/C catalyst

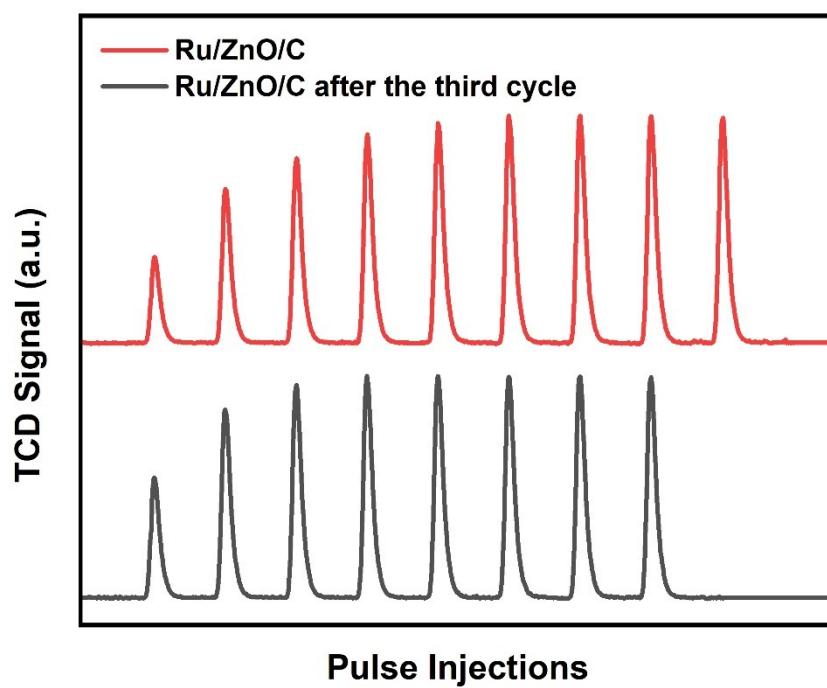
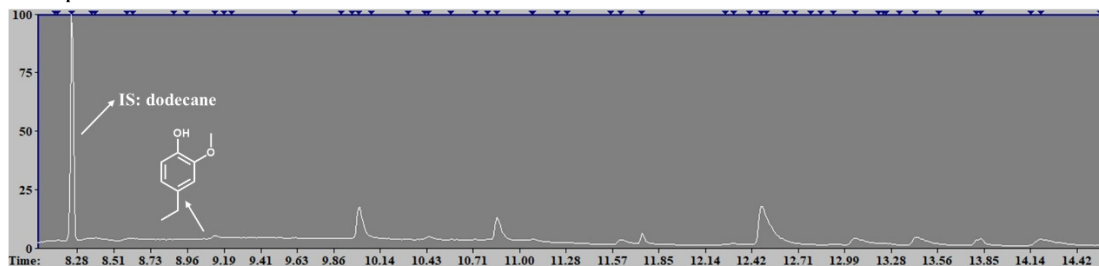


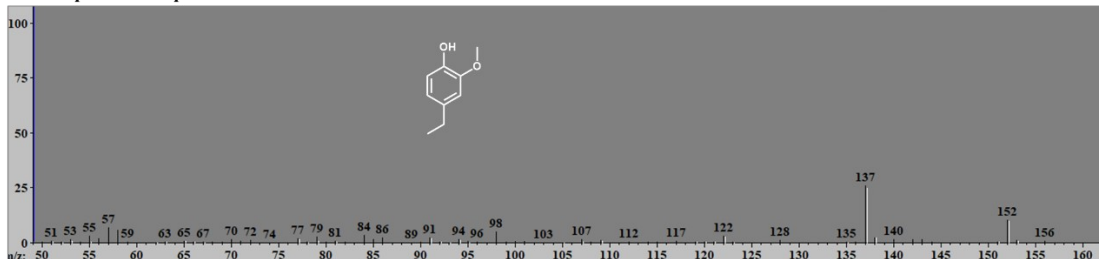
Figure S4. Hydrogen pulse chemical adsorption of fresh and spent Ru/ZnO/C catalyst

**GC-MS analysis for phenolic monomer products in in hydrogen-transfer reductive catalytic fractionation of poplar wood over Ru/ZnO/C catalyst**

**TIC spectrum of the reaction mixtures**



**Mass spectrum of product**



**Mass spectrum of standard sample in NIST database**

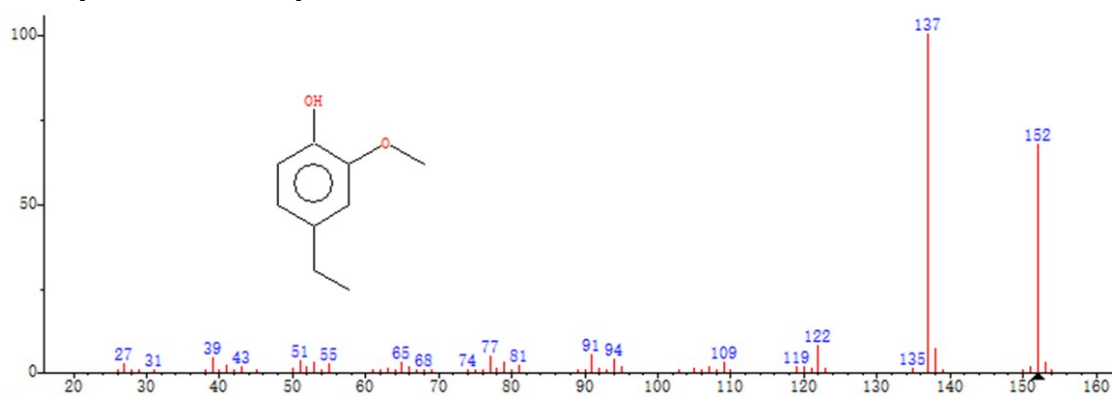


Figure S5. MS analysis of product (1) 4-ethylguaiacol

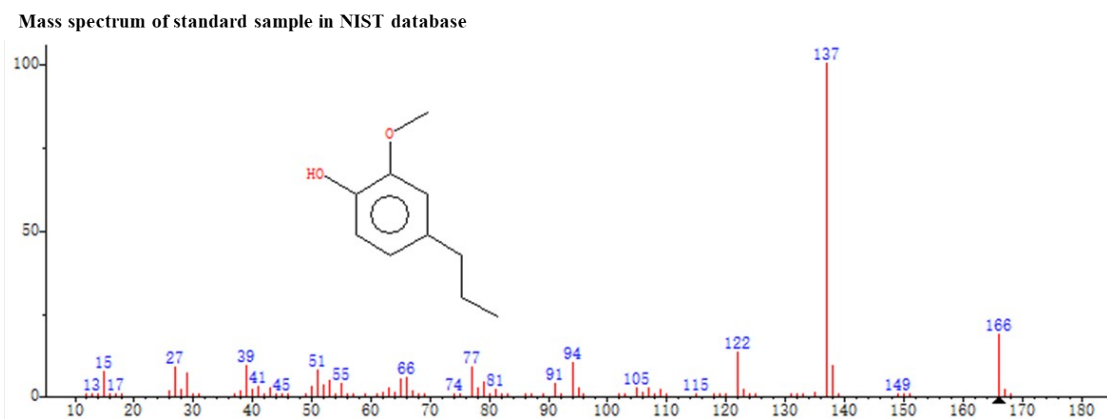
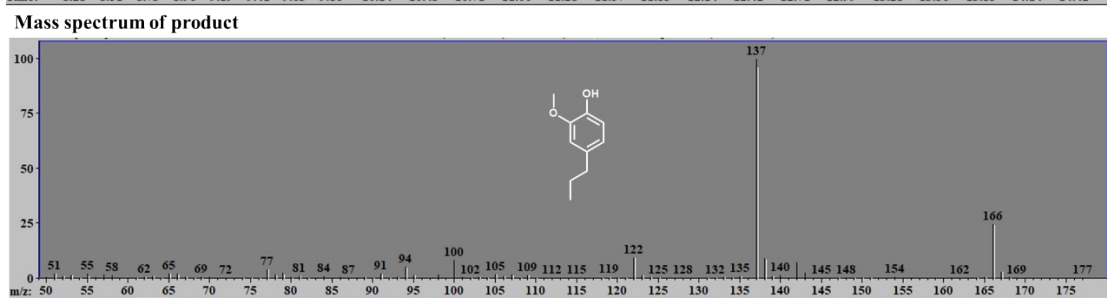
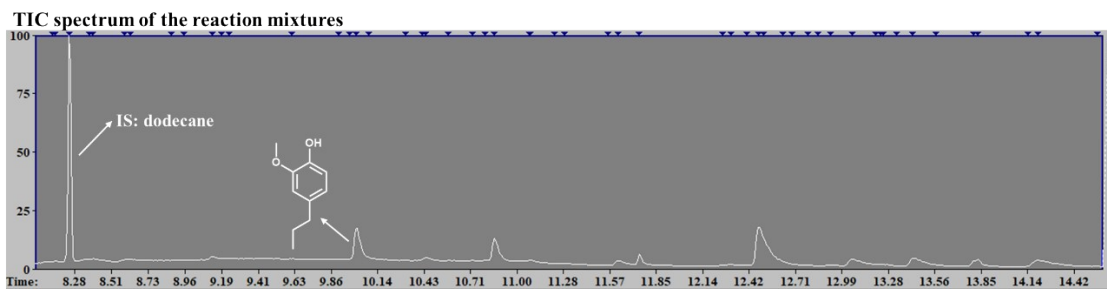
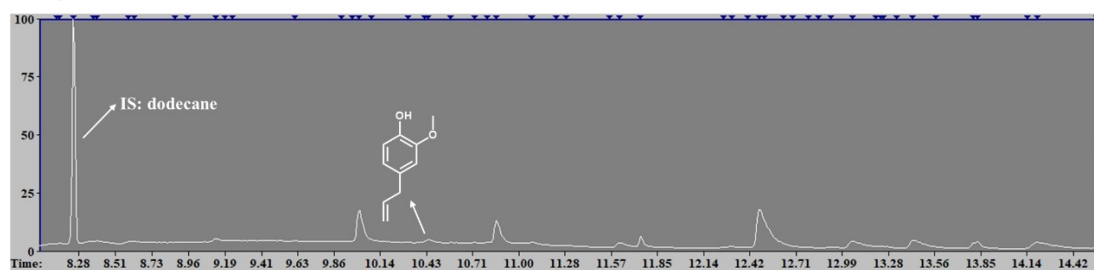
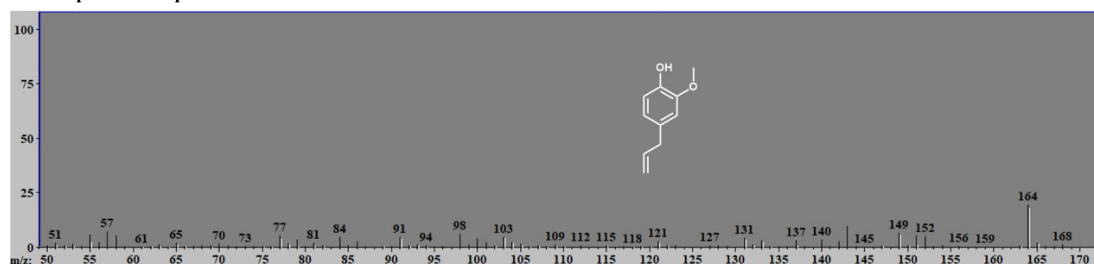


Figure S6. MS analysis of product (2) 4-n-propylguaiacol

TIC spectrum of the reaction mixtures



Mass spectrum of product



Mass spectrum of standard sample in NIST database

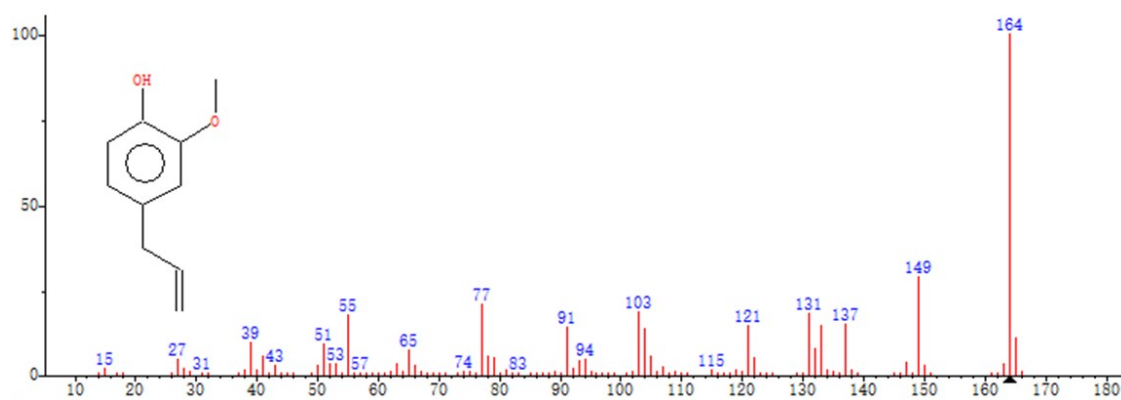
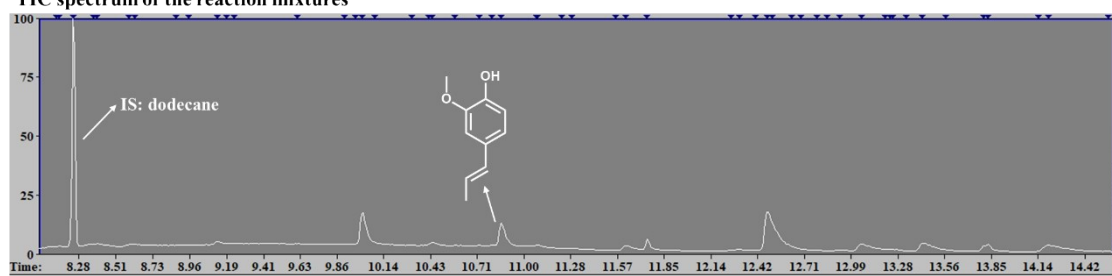
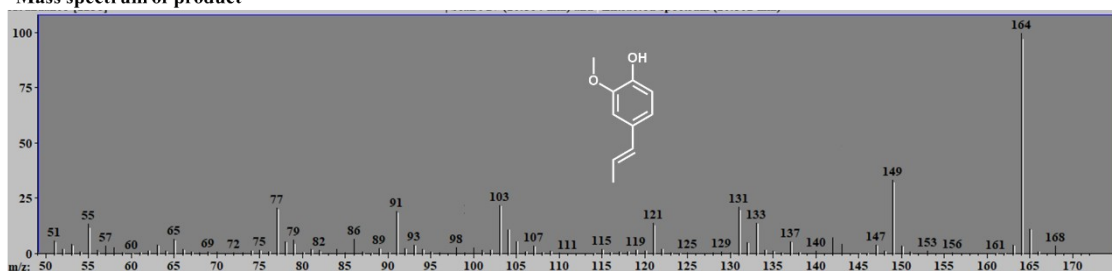


Figure S7. MS analysis of product (3) eugenol

TIC spectrum of the reaction mixtures



Mass spectrum of product



Mass spectrum of standard sample in NIST database

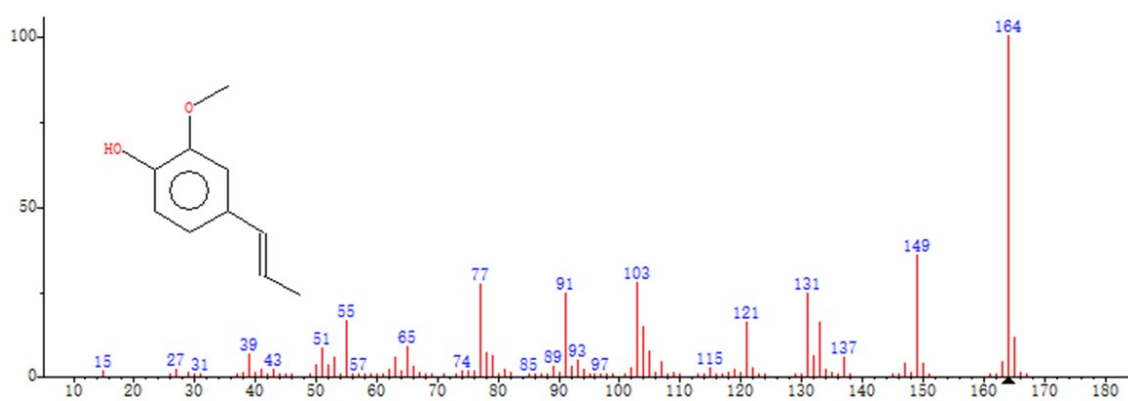
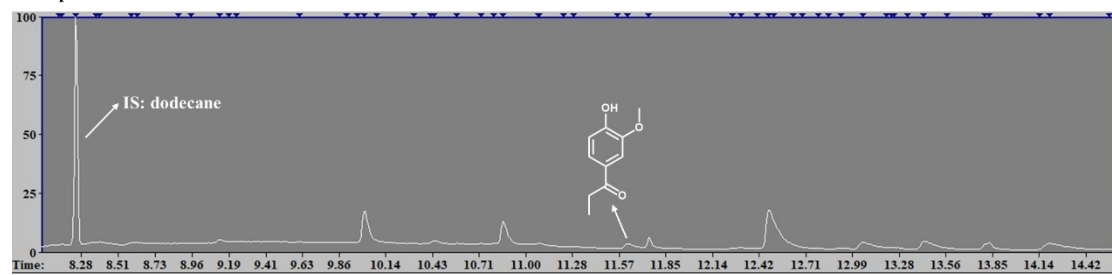
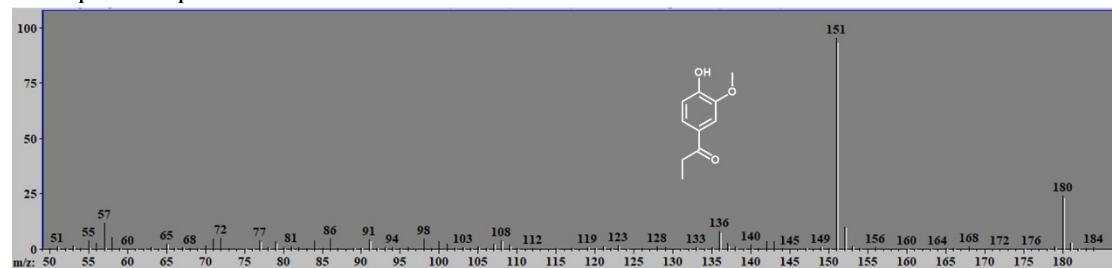


Figure S8. MS analysis of product (4) isoeugenol

TIC spectrum of the reaction mixtures



Mass spectrum of product



Mass spectrum of standard sample in NIST database

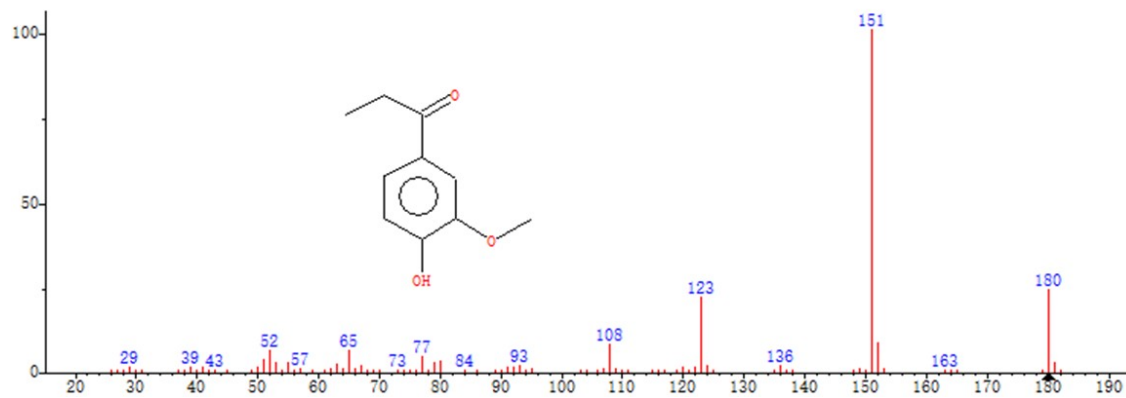
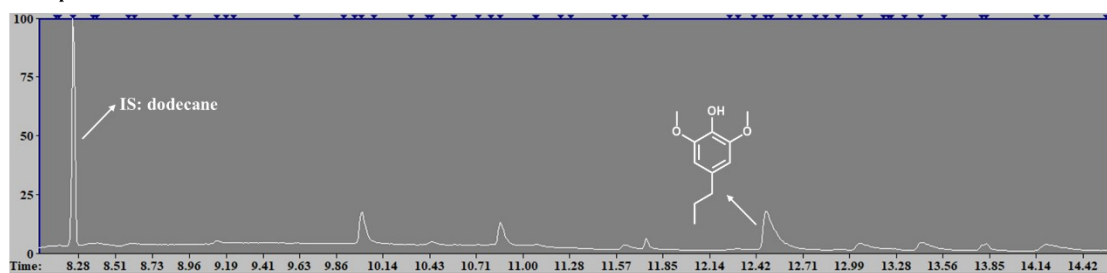
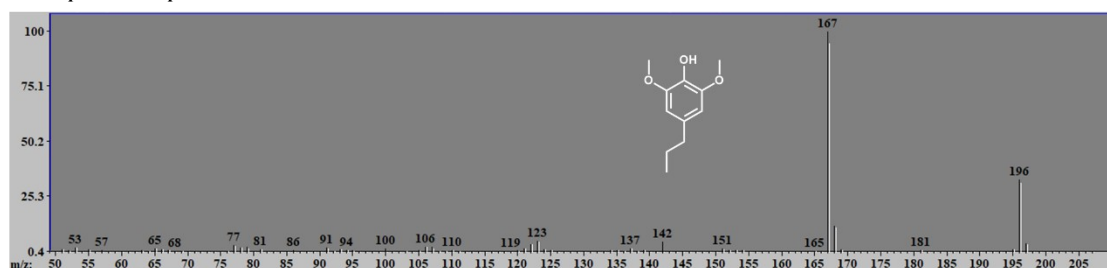


Figure S9. MS analysis of product (5) 3-dimethoxy-4-hydroxypropiophenone

TIC spectrum of the reaction mixtures



Mass spectrum of product



Mass spectrum of standard sample in NIST database

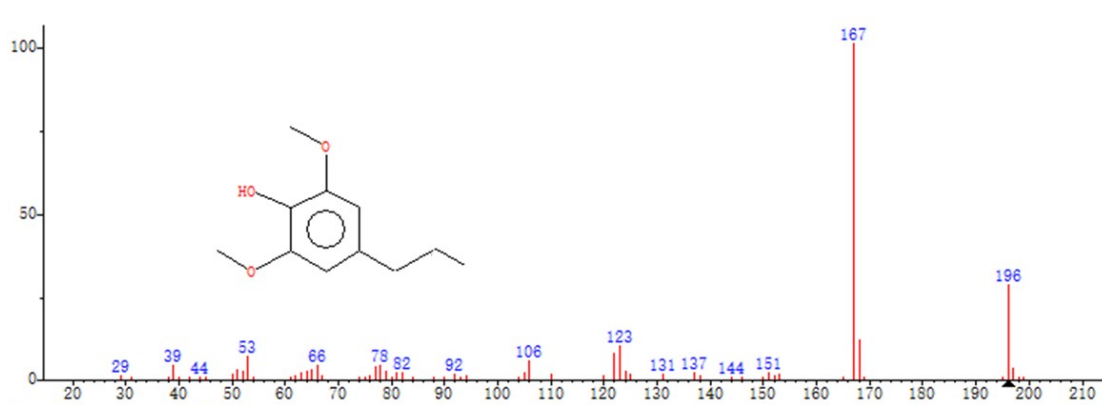
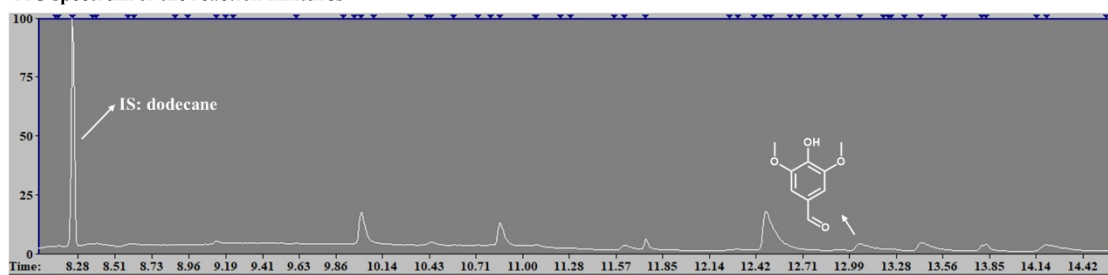
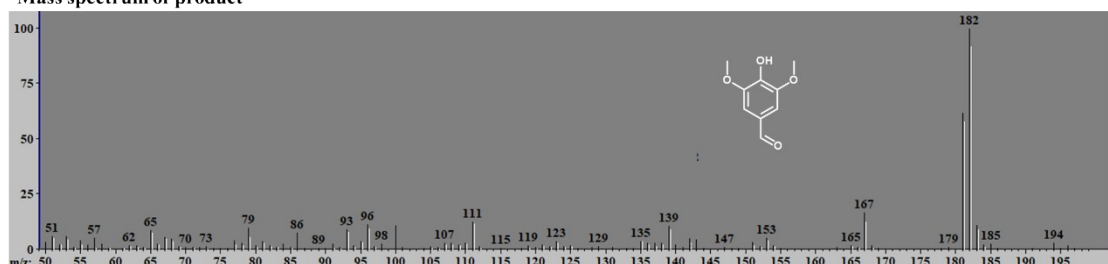


Figure S10. MS analysis of product (6) 4-n-propylsyringol

TIC spectrum of the reaction mixtures



Mass spectrum of product



Mass spectrum of standard sample in NIST database

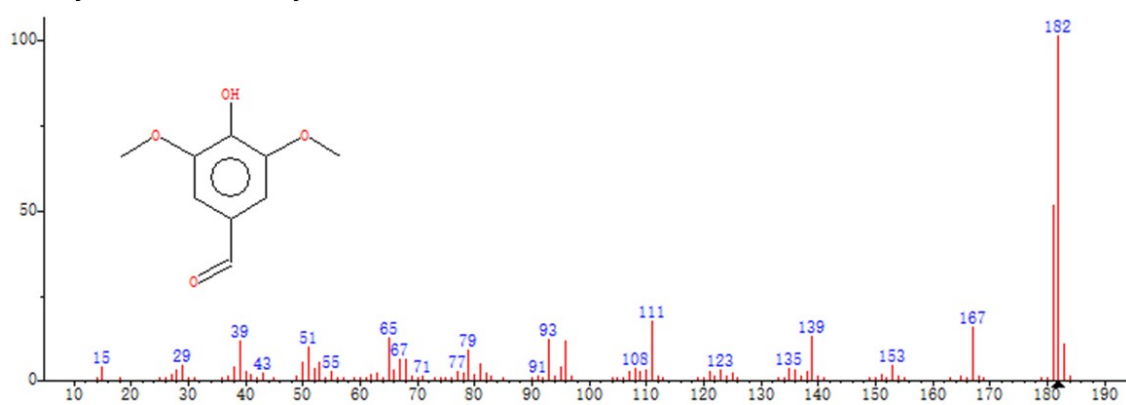


Figure S11. MS analysis of product (7) 4-hydroxy-3,5-dimethoxy-benzaldehyde

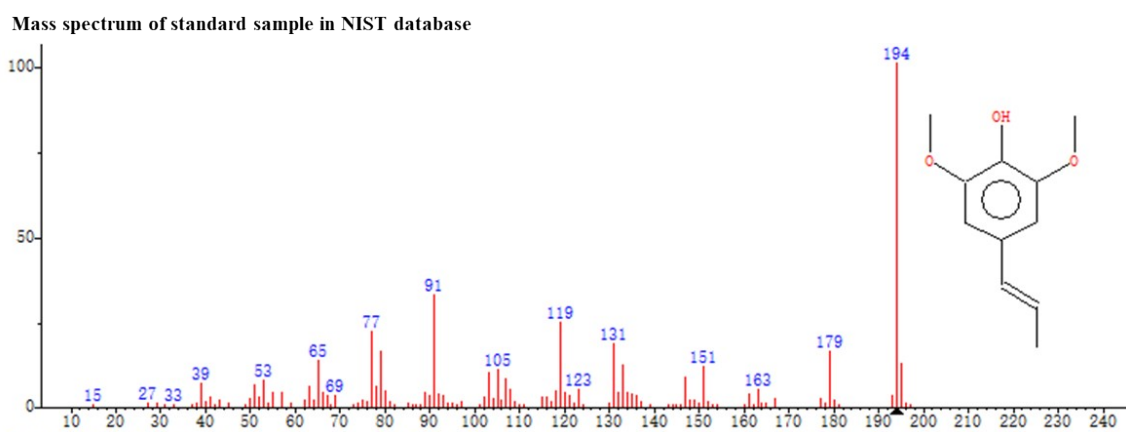
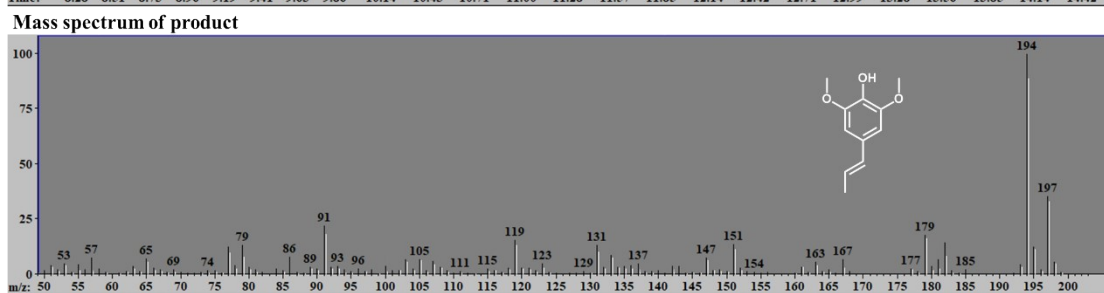
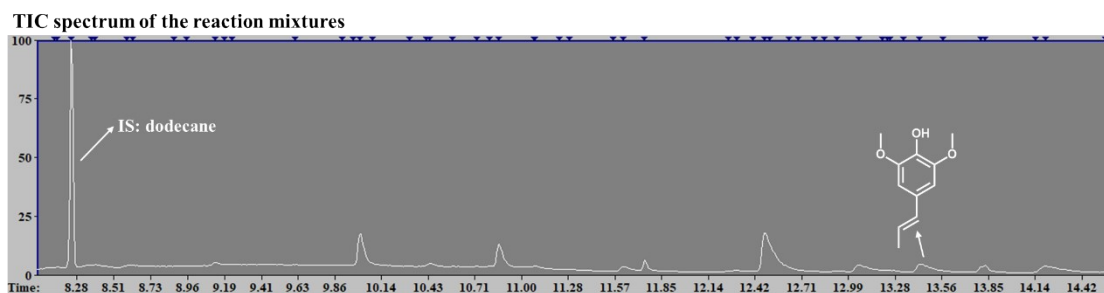
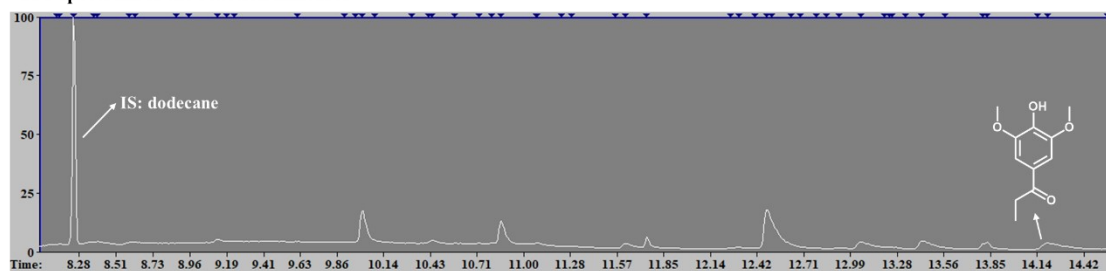
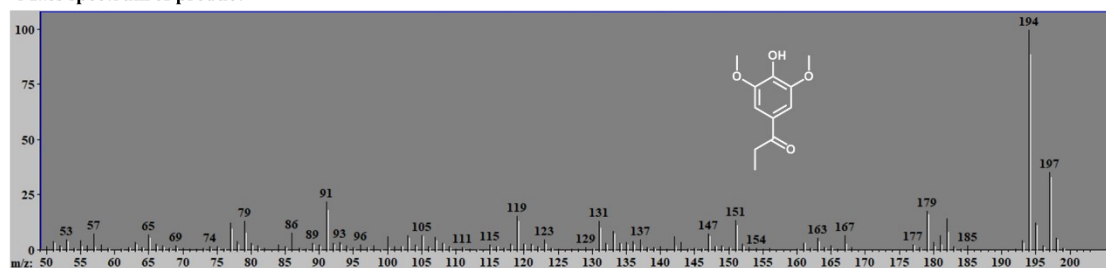


Figure S12. MS analysis of product (8) 4-prop-1-enylsyringol

TIC spectrum of the reaction mixtures



Mass spectrum of product



Mass spectrum of standard sample in NIST database

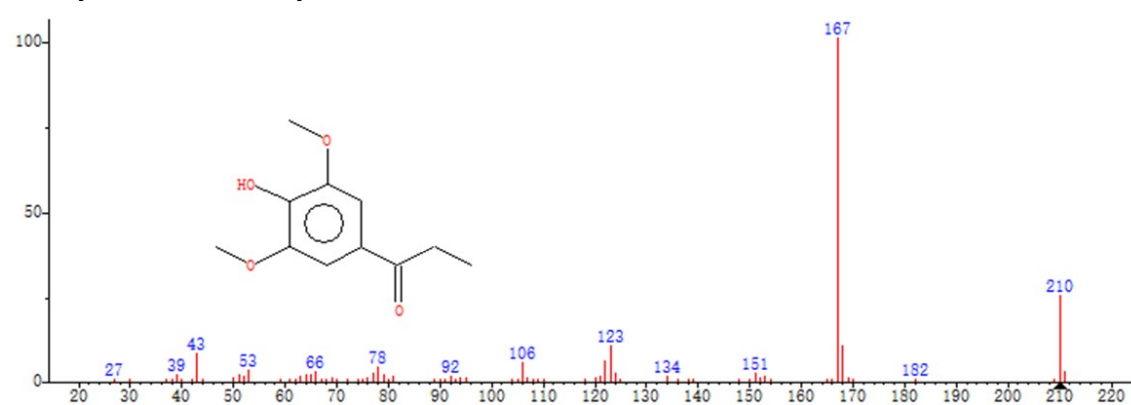


Figure S13. MS analysis of product (9) 3,5-dimethoxy-4-hydroxypropiophenone

Table S1 The Reichardt's  $E_N^T$  values, the Kamlet-Taft hydrogen donor acidity  $\alpha$ , the Kamlet-Taft hydrogen acceptor basicity  $\beta$ , the Kamlet-Taft dipole-polarization parameter  $\pi^*$ , and the dielectric constant  $\epsilon$  for different solvents

Solvent	$E_N^T$	$\alpha$	$\beta$	$\pi^*$	$\epsilon$
EtOH	0.654	0.86	0.75	0.54	24.35
n-PrOH	0.617	0.84	0.9	0.52	20.34
i-PrOH	0.546	0.76	0.84	0.48	19.92
Diox	0.164	0	0.37	0.55	2.21
CYH	0.006	0	0	0	2.02
EG	0.790	0.90	0.52	0.92	37.00