

SUPPLEMENTARY INFORMATION

Hydrodeoxygenation of Karanja Oil over Supported Nickel Catalysts: Roles of support and nickel loading on $\gamma\text{-Al}_2\text{O}_3$

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Table S1 Reproducibility, reusability, and regeneration ability of 20NiAl for HDO of KO.

Experiments	X	Product distribution at 35% conversion of oxygenates, wt%										
		<PD	PD	HXD	HPD	OD	>OD	ODL	PA	SA	MP	MS
Reproducibility												
Rxn – 1	56.1	4.2	4.7	1.3	19.4	0.7	4.7	1.2	12.1	47.2	0.0	4.5
Rxn – 2	59.6	3.9	4.7	1.2	19.8	0.7	4.7	1.1	11.6	47.4	0.0	4.9
Reusability of spent catalyst												
Rxn – 3	37.3	9.1	5.5	3.0	9.7	1.5	6.2	1.1	16.5	41.6	0.0	5.8
Reusability of regenerated spent catalyst												
Rxn – 4	55.2	5.2	4.8	1.6	17.5	0.7	5.2	1.8	9.0	49.7	0.0	4.6

Reaction conditions: 653 K, 35 bar H_2 , 4 (w/w)% 20NiAl, 100 ml H_2 /min. X = conversion of oxygenates at 480 min of reaction time, %.

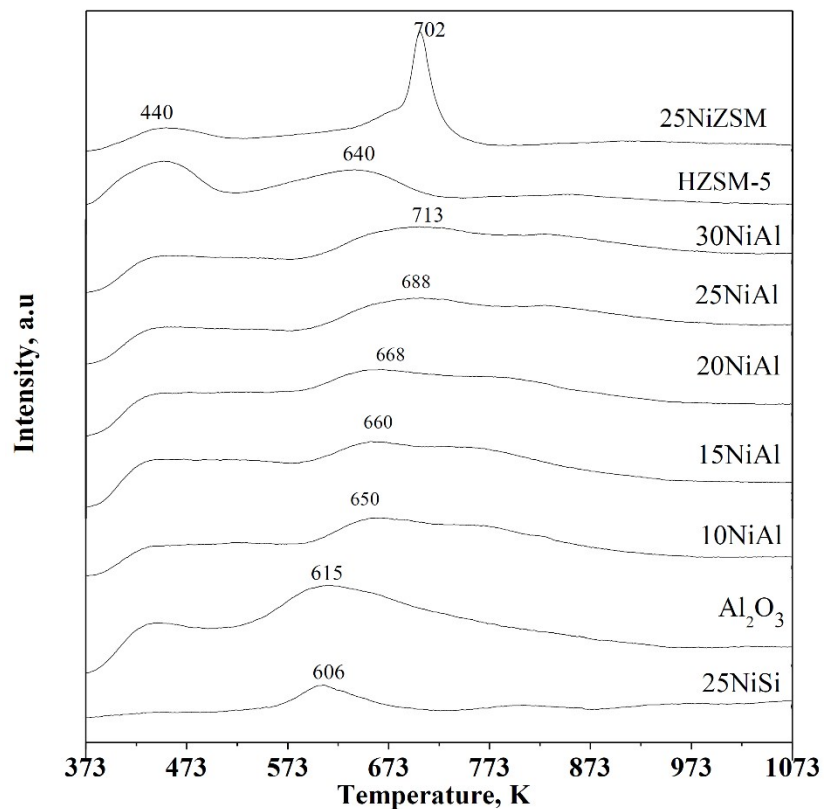


Fig. S1 TPD profile of reduced catalysts.

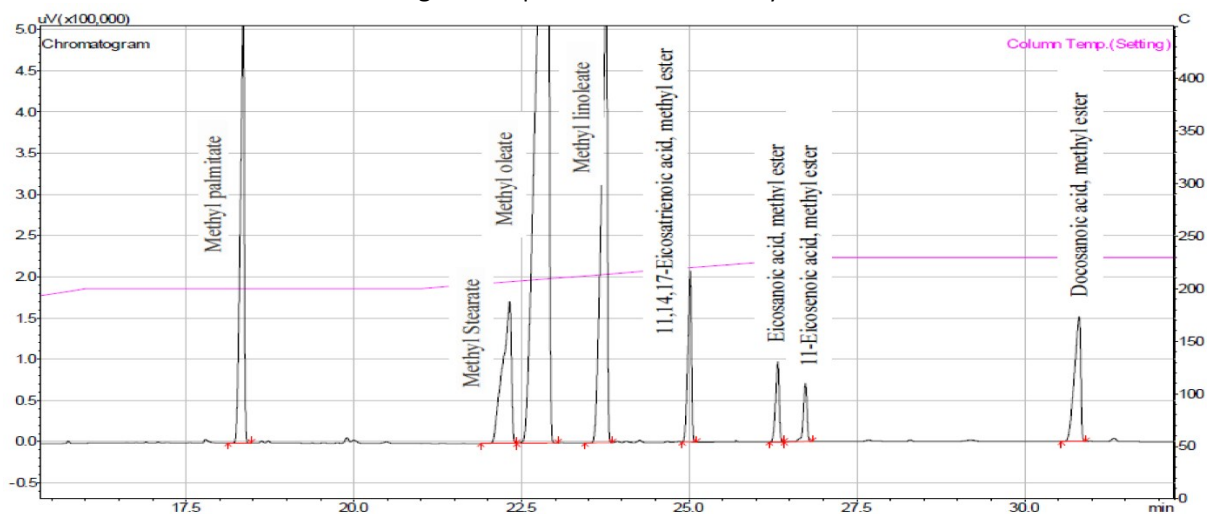


Fig. S2 Typical chromatogram of FAME derived from KO. Analysis conditions: ZB-wax column (30 m×0.25 mm×0.25μm), helium as carrier gas, injector and detector temperature = 503 K, and oven temperature programming: temperature was kept at 333 K for 2 min, ramped to 473K (@10 K/min) and kept at this temperature for 5 min, and ramped to 503 K (5 K/min) and kept there for 15 min.

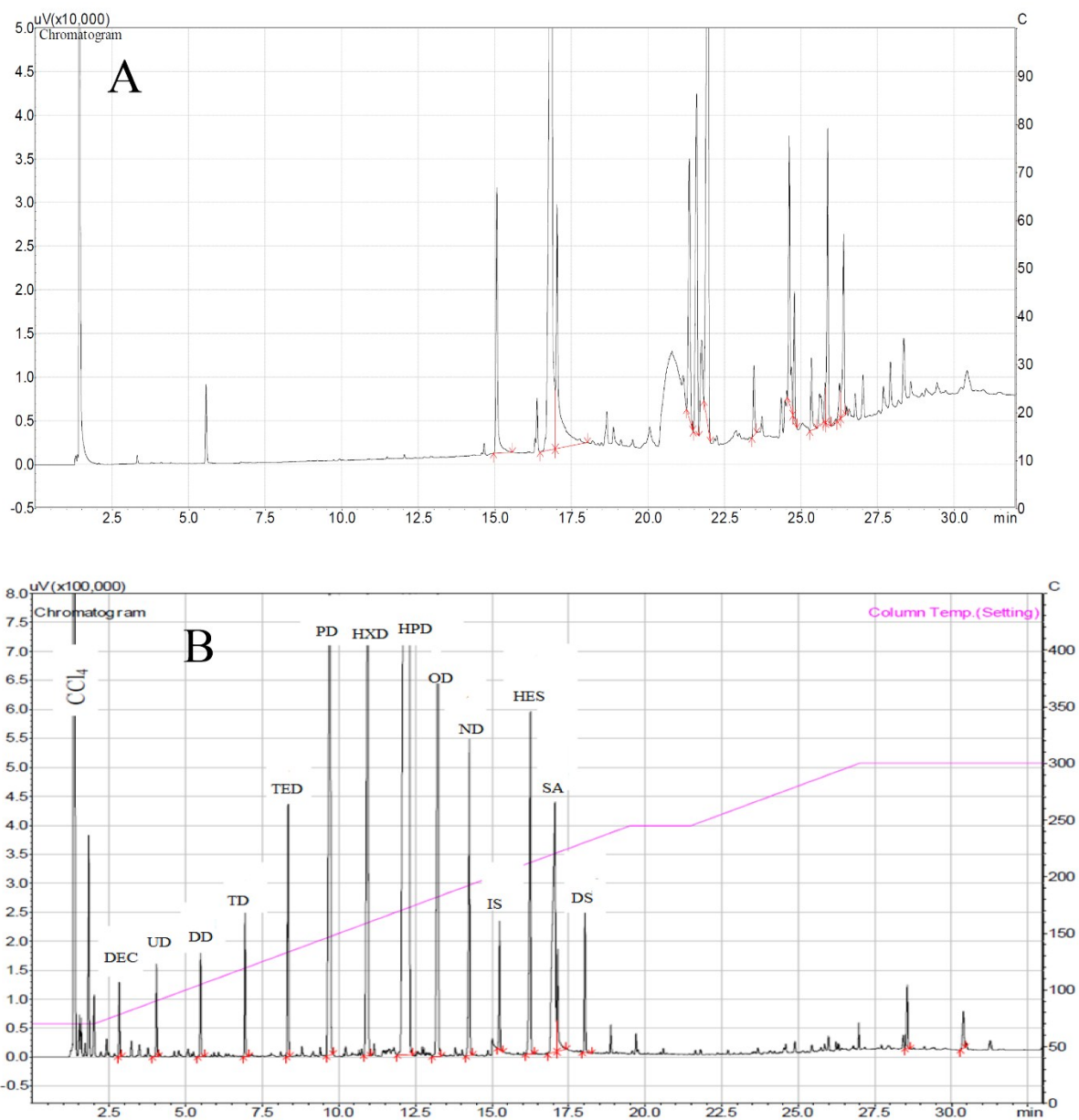


Fig. S3 Typical chromatogram of (A) karanja oil and (B) liquid product. Reaction conditions: 653 K, 35 bar H₂, 4 (w/w)% 25NiAl. Analysis conditions: ZB-5HT column (Phenomenex, 30 m×0.32 mm×0.10 μm), helium as carrier gas, injector = 573 K, detector = 613 K, and oven temperature programming: oven temperature was kept at 343 K for 5 min and increased to 523 K (@10 K/min) and kept at this temperature for 2 min. The temperature was further increased to 573 K (@10 K/min) and kept at this temperature for 5 min.

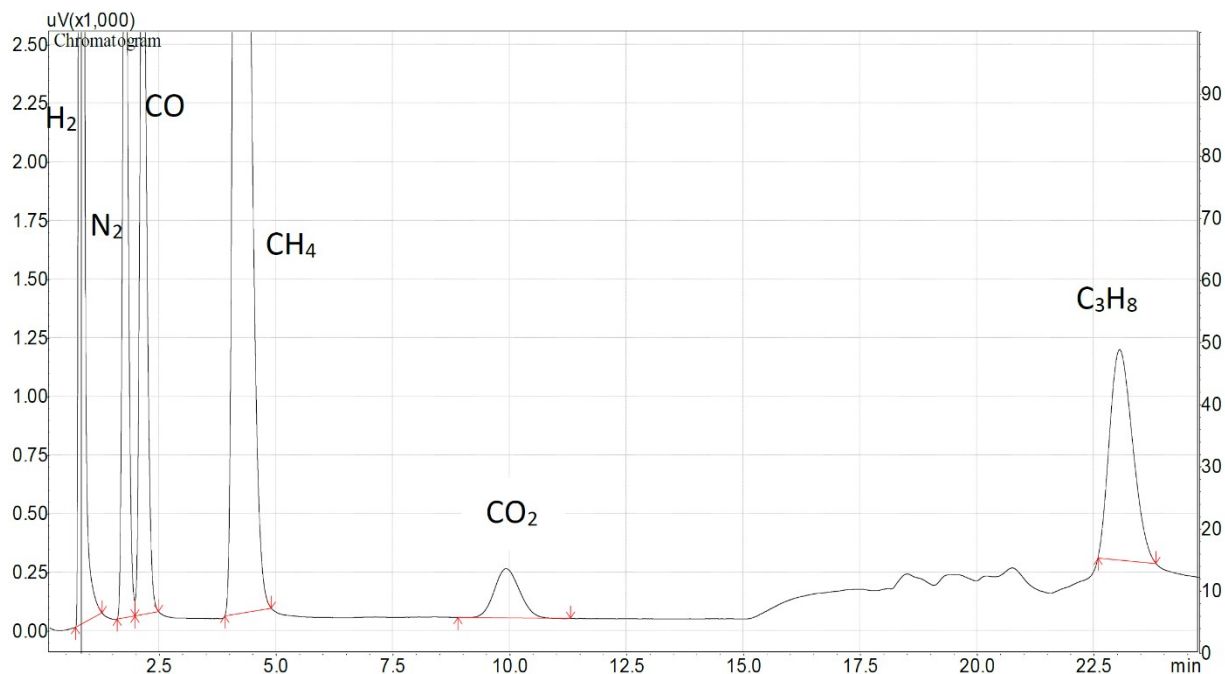


Fig. S4 The typical chromatogram of gas sample. Reaction conditions: 23K, 35 bar H₂, 10(w/w)% 20NiAl. Analysis conditions: carboseive S-II column (Chromatopak, 3 m×1/8"), argon carrier gas, injector = 378 K, detector = 523 K, and oven temperature programming: oven temperature was kept at 333 K for 15 min, ramped to 473 K (30 K/min), and held at this temperature for 7 min.

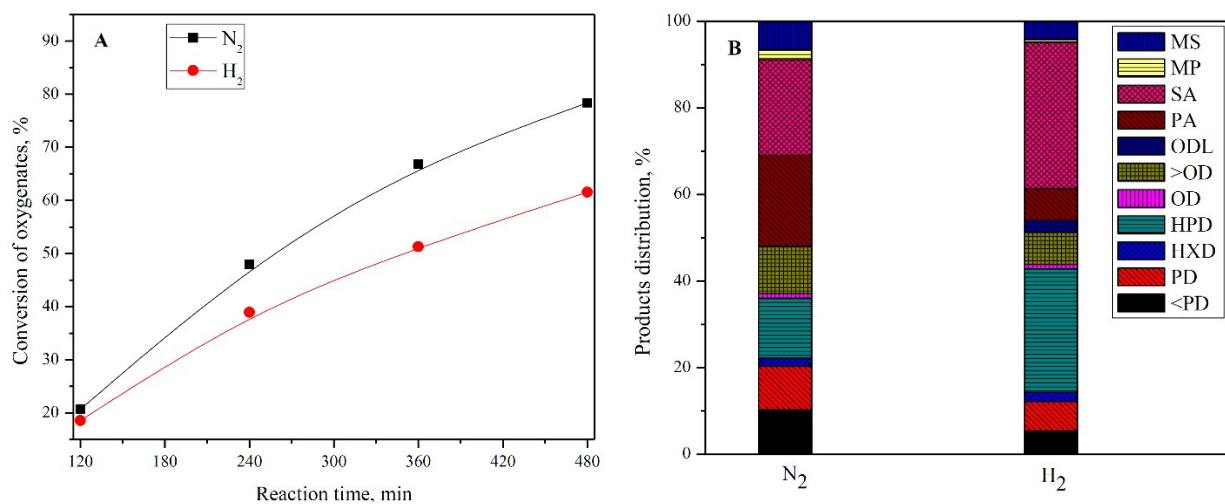


Fig. S5 Effect of atmosphere on (A) conversion of oxygenates and (B) product distribution at 50% conversion of oxygenates. Reaction conditions: 653 K, 35 bar, 4(w/w)% 20NiAl, 100 ml/min.

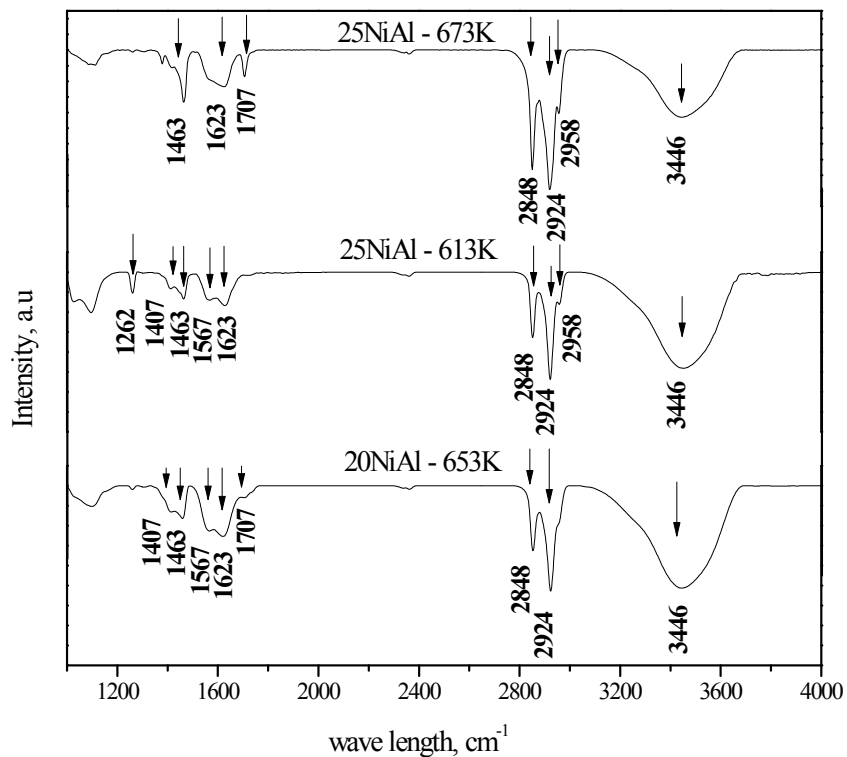


Fig. S6 FTIR profile of spent catalysts. 3446 - $\nu_s(\text{O-H})$; 2848, 2924, 2958 - $\nu_s(\text{C-H})$ aliphatic; 1707 - $\nu_s(\text{C=O})$; 1623 - $\nu_s(\text{C=C})$; 1567 - $\nu_{as}(\text{COO}^-)$; 1463 - $\nu_s(\text{COO}^-)$; 1407 - $\nu_{as}(\text{C-H})$ bending; 1262 - $\nu_a(\text{C-C})$. All other reaction conditions are reported in Table S1.

Analysis procedure: FTIR analysis of spent catalyst was performed in Bruker Tensor 37 equipped with air cooled IR source and low noise DLATGS detector. Spent catalysts were first mixed with KBr powder (less than 1 wt%) and pelletized using hydraulic press. IR spectra of prepared samples were then acquired in transmission mode in the wave number range of 400–4000 cm^{-1} at ambient temperature with a spectral resolution of 4 cm^{-1} and 256 number of scan using KBr as background.

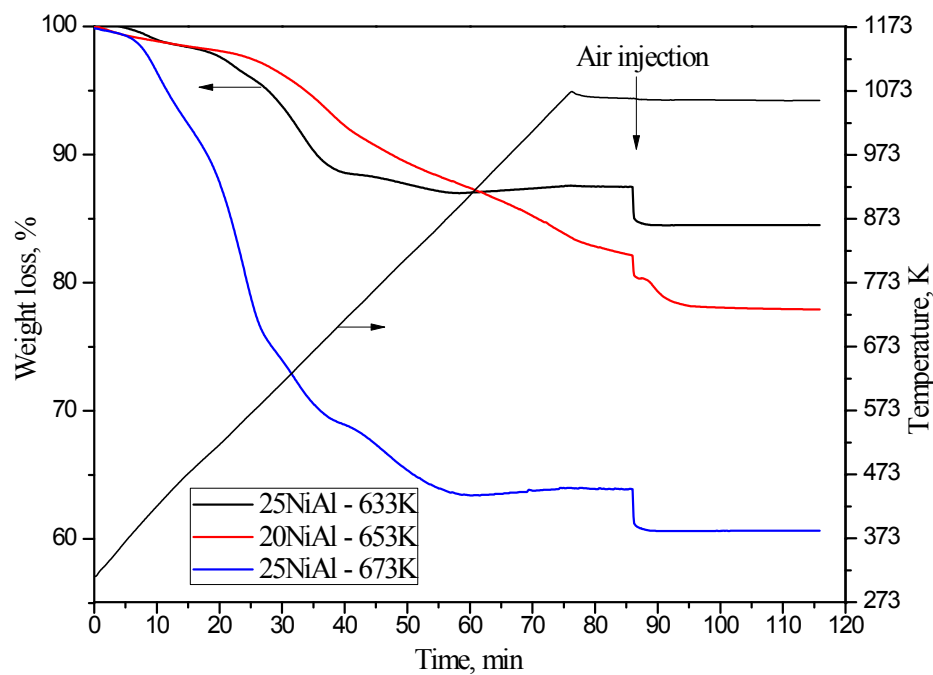


Fig. S7 TGA analysis of spent catalyst. All other reaction conditions are reported in Table S1.

Analysis procedure: TGA analysis of spent catalyst was performed in Perkin Elmer pyris 1 TGA. Known quantities of spent catalyst was loaded into ceramic crucible. The sample was then exposed to helium gas (30 ml/min) with concurrent heating to 1073 K with a heating rate of 10 K/min and hold for 10 min at 1073 K. The sample was then exposed to air (30 ml/min) for 30 min.