

Vapor-Phase Oxidation of Cyclohexane over Supported Fe-Mn Catalysts: *In-Situ* DRIFTS studies

Vijendra Kumar Yadav, Taraknath Das*

Heterogeneous Catalysis Laboratory (Reaction Engineering), Department of Chemical Engineering, Indian Institute Technology Roorkee, Haridwar, Uttarakhand, India 247667, Email: taraknath.das@ch.iitr.ac.in or tarak3581@gmail.com

Supporting material:

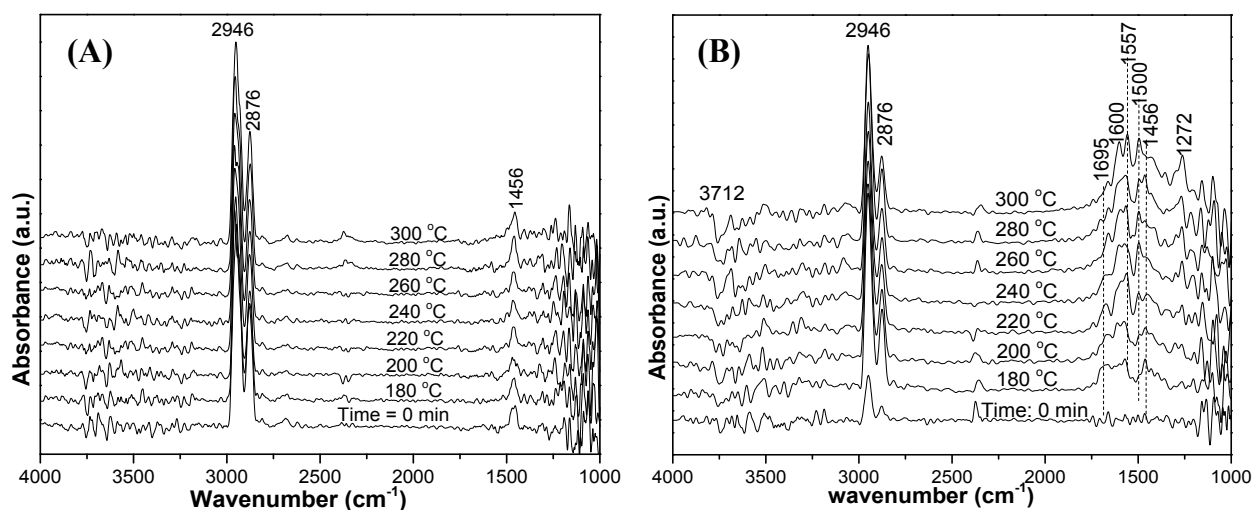


Fig. S1: *In-situ* DRIFTS adsorption of cyclohexane (Cy-H) over the catalysts (A) Al_2O_3 , and (B) $20\text{Fe}_{50}\text{Mn}_{50}/\text{Al}_2\text{O}_3$ by changing the adsorption temperature from 180 °C to 300 °C.

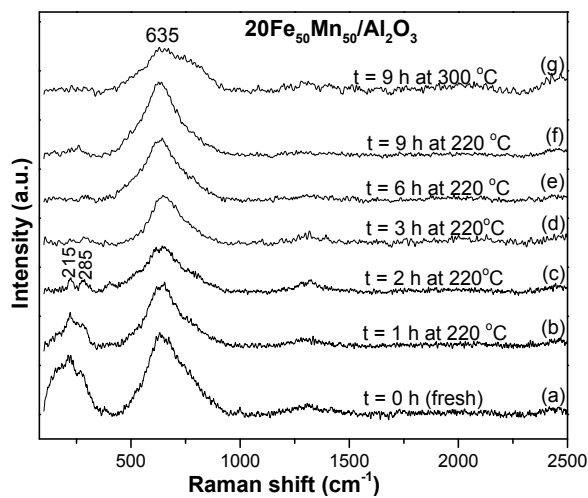


Fig. S2: The Raman spectra of the used catalysts $20\text{Fe}_{50}\text{Mn}_{50}/\text{Al}_2\text{O}_3$ studied for the cyclohexane oxidation reaction for (a) fresh catalyst (with no reaction), $t = 0$ h, (b) 1 h, (c) 2 h, (d) 3 h, (e) 6 h, (f) 9 h at 220°C , and (g) at 300°C for 9 h.

Table-S1: H₂ consumption of the synthesized catalysts during the H₂-TPR studies

Catalysts	H ₂ -Consumption (ml/g _{cat})	H ₂ -Consumption (μmole/g _{cat})	H ₂ -Consumption (mole H ₂ /(Mn+Fe mole))
Al ₂ O ₃	-	-	-
20Fe ₁₀₀ Mn ₀ /Al ₂ O ₃	43.69	1950	0.55
20Fe ₇₅ Mn ₂₅ /Al ₂ O ₃	46.26	2065	0.58
20Fe ₅₀ Mn ₅₀ /Al ₂ O ₃	68.61	3063	0.85
20Fe ₂₅ Mn ₇₅ /Al ₂ O ₃	58.23	2599	0.72
20Fe ₀ Mn ₁₀₀ /Al ₂ O ₃	54.91	2451	0.68
5Fe ₅₀ Mn ₅₀ /Al ₂ O ₃	23.45	1047	1.16
10Fe ₅₀ Mn ₅₀ /Al ₂ O ₃	32.73	1461	0.81
15Fe ₅₀ Mn ₅₀ /Al ₂ O ₃	48.93	2184	0.81
20Fe ₅₀ Mn ₅₀ /Al ₂ O ₃	68.61	3063	0.85
25Fe ₅₀ Mn ₅₀ /Al ₂ O ₃	78.65	3511	0.78