

Highlights:

- Final oleyl alcohol yields up to 94% are obtained through non-catalytic catalytic experiments during methyl oleate reduction without the supply of H_2
- A temperature of 333 K and a methyl oleate/ $NaBH_4$ molar ratio of 0.11 result the optimized conditions for oleyl alcohol synthesis
- Metal-based catalysts with high acid site number and polarizing power favor oleyl alcohol synthesis
- A DFT modeling of mechanism reaction confirm the analysis carried out at macroscopic level based on experimental results
- Theoretical calculations confirm that formation of reducing methoxyborohydride species is energetically favored