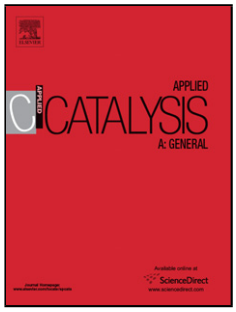

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Glycerol dehydration to hydroxyacetone in gas phase over copper supported on magnesium oxide (hydroxide) fluoride catalysts

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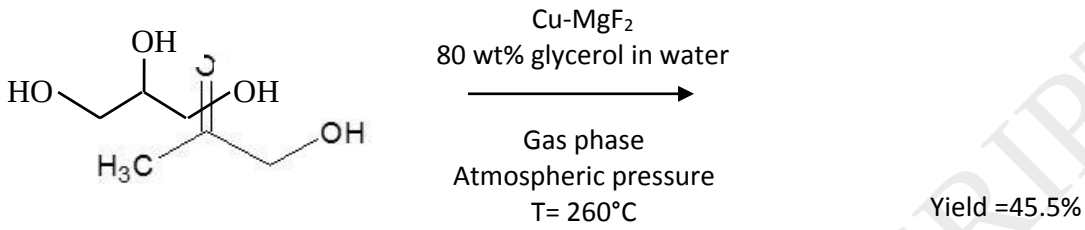
Graphical abstract



Highlights

- Highlignts
- High yields of hydroxyacetone was achieved in gas phase over CuOx-MgF_2 at 260°C
- The performances obtained with Cu-MgF_2 were higher than those obtained with La_2CuO_4
- Copper is stabilized as Cu^{+1} in Cu-MgF_2 during reaction

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Abstract:

The dehydration of glycerol to hydroxyacetone was studied over copper-based catalysts using magnesium oxide (hydroxide) fluoride with various F/Mg ratio as support of copper. After calcination at 350°C, the incorporation of copper, mainly at + II oxidation state, into the support lattice was observed for MgO and MgF(OH) while, copper was stabilized as Cu^{+1} at the surface of Cu-MgF_2. The reaction of dehydration was performed using a mixture of glycerol and water (80%wt of glycerol), in gas phase at 260°C. Cu-MgF_2 was the most active catalyst with a yield in hydroxyacetone of 45.5%, while the catalytic activity was very low for Cu-MgF(OH) and Cu-MgO (yield in HA <10%). Moreover, the performances obtained for Cu-MgF_2 were higher than those obtained with La_2CuO_4, a reference catalyst. After four hours of reaction, Cu-MgF_2 was not significantly modified, while for the two other catalysts, Cu^{2+} initially present was reduced into metallic copper. The results obtained revealed that the basic properties of the catalysts did not govern the reaction of dehydration of glycerol into HA. The best catalyst (Cu-