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# SUPPORTED CARBIDES FOR BIFUNCTIONAL HYDROGENOLYSIS OF WOOD INTO GLYCOLS

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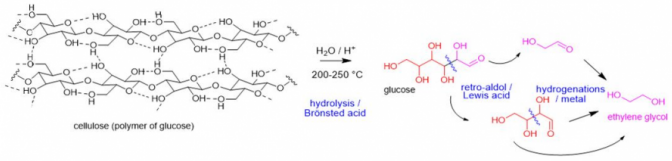
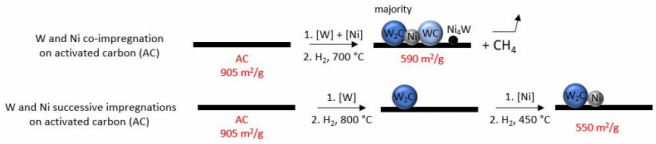
## PURPOSE OF THE ABSTRACT

For a more sustainable production of chemicals, the use renewable resources is essential. We present here the formation of ethylene glycol (EG) and propylene glycol (PG) for lignocellulose. They can be obtained by catalytic hydrogenolysis of cellulose or hemicellulose, polysaccharide components of wood [1]. The transformation requires successive steps, involving different catalytic sites: hydrolysis of polysaccharides and carbon-carbon cleavages (retro-aldol) by acid catalysis, then hydrogenations by metal catalysis (Figure 1).
Literature indicates that supported M-WxC catalysts (x = 1-2; M = Ni, Ru, etc.) have the required characteristics [2]. Lewis acidity is provided by the tungsten carbide phase and the hydrogenating power by the supported metal, while the Bronsted acidity is provided by water in the reaction conditions. Therefore, they are good candidates for the target catalytic transformation.
We present here our studies on the influence of the preparation method on the surface species of Ni-WxC/AC materials (Figure 2), and on their application to wood transformation into EG and PG.
Results indicate that the transformation selectivity depends on several factors involved in the catalyst preparation, and on wood reactant composition.
For example, the co-impregnation method leads to several metal species at the surface while the successive impregnation gives a main phase, moreover without loss of carbon support. Hence, the various materials present different catalytic behavior that influence the wood transformation.
Overall, molar yields up to 60% of EG and 30% of PG could be obtained at 250 °C in reaction times less than 1 hour with 5%Ni-30%WxC/AC catalysts.
Insights on catalyst preparation, characterization and application conditions with possible structure-reactivity relationships will be given during this presentation.

## FIGURES




### FIGURE 1

Hydrogenolysis of cellulose to ethylene glycol

Steps of catalytic hydrogenolysis of cellulose into ethylene glycol

### FIGURE 2

Comparison of preparation mode

Representation of the two different catalyst impregnation methods


## KEYWORDS

Biomass | Carbide | Hydrogenolysis | Glycol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