Internship offer: Master 2

Conversion of Glycerol to Glyoxal by Oxydation

The Glycerol (or 1, 2, 3-propanetriol) is commonly used in pharmaceutic industries, cosmetic (moisturizing agent, solvent, lubricant) and food (sweetener, emulsifier, thickening). It is in particular an important by-product of the transesterification reaction of vegetable oil: it represents about 10% in weight of biodiesel production. This last don't stop in increasing since the mid of years 2000, the production of Glycerol is provided to attend 3.7 Mt in 2020 [1]. Therefore, the resource in Glycerol is abundant and thereby, its price is relatively weak (900-1000 US$/t in June 2012)

We can obtain from Glycerol different target molecules by heterogeneous catalyst, between these target possible molecules (Figure 1) [2]

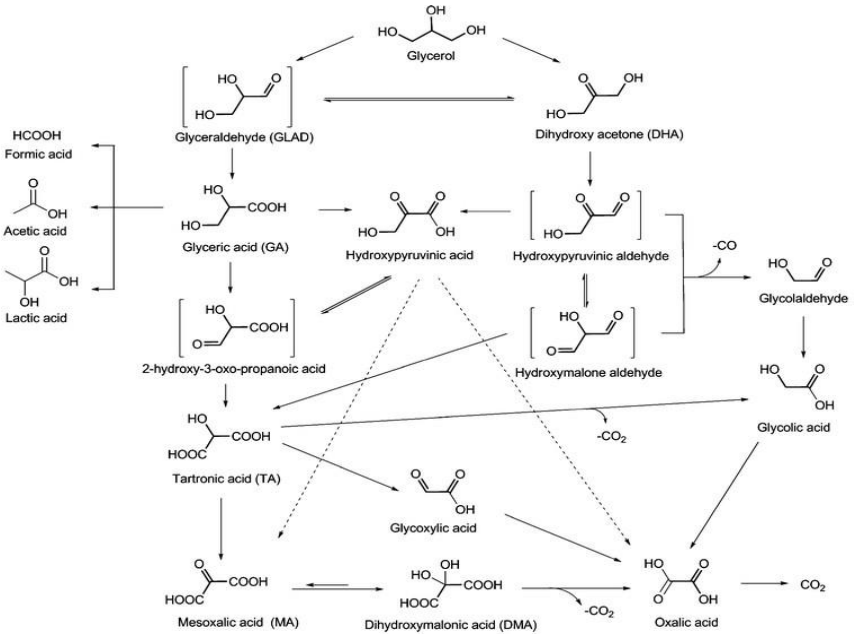

Figure 1: Products obtained from the oxidation of Glycerol [2].

During this training, we will be particularly interested in Glyoxal, which we can obtain, by direct glycoldehyde obtained from two reactions: 1) from Glycerol to Glyceraldehyde by heterogeneous catalysis and 2) from glyceraldehyde to glycoaldehyde by enzymatic catalysis, but the difficulty of this reaction is the undesirable over oxidation. To avoid this problem we decided to optimize the different parameters of our reaction (T, P (O_2), concentration…)

During this training, we propose the study of the conversion from Glycoaldehyde into Glyoxal in liquid phase by bimetallic catalyst based on Pt, Cu and other transitions metals supported on SiO_2. After the synthesis we use different chemical physicist classic technics (measure of specific surface, DRX, MET, elementary chemical analysis (ICP), etc….). Finally, the catalytic

activity of the prepared catalyst will be tested in liquid phase under oxygen with different temperature and concentration of Glycoldehyde.
The continuation of the Glyceraldehyde oxidation reaction will be done by chromatography in liquid phase under high performance.

References

[1] B. Katryniok, S. Paul, V. Bellère-Baca, P. Rey, F. Dumeignil, Green. Chem. 12 (2010) 2079-2098.

[2] B. Katryniok, H. Kimura, E. Skrzyńska, J-S. Girardon, P. Fongarland, M. Capron, R. Ducoulombier, N. Mimura, S. Paul, F. Dumeignil, Green Chem 13 (2011) 1960.

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