QUÍMICA SUSTENTÁVEL

UM TEMA ... UMA REFLEXÃO

XX ENCONTRO NACIONAL

SOCIEDADE PORTUGUESA DE QUÍMICA

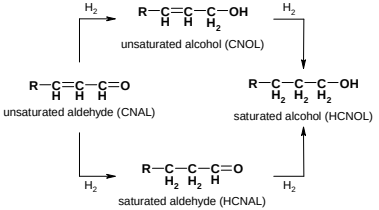
14 A 16 DEZEMBRO 2006 CAMPUS DE CAPARICA - FCTIUNL

Carbon nanotubes supported catalysts for selective hydrogenation of unsaturated aldehydes

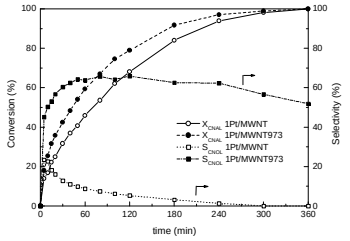
Bruno F Machado[1], Helder T Gomes[1,2], Philippe Serp[3], Philippe Kalck[3], Joaquim L Faria[1]

§ [1]*Laboratório de Catálise e Materiais, Departamento de Engenharia Química, Faculdade de Engenharia da Universidade do Porto, Portugal*
[2]*Departamento de Tecnologia Química e Biológica, Escola Superior de Tecnologia e de Gestão do Instituto Politécnico de Bragança, Portugal*
[3]*Laboratoire de Catalyse, Chimie Fine et Polymères, Ecole Nationale Supérieure d'Ingénieurs en Arts Chimiques Et Technologiques, France*
email: bmachado@fe.up.pt

Selective catalytic hydrogenation of organic substrates containing unsaturated functional groups is an important step in the industrial preparation of fine chemicals. Allylic alcohols are obtained by the reduction of the carbonyl group in α,β-unsaturated aldehydes and are valuable intermediates for the production of perfumes, flavoring additives, pharmaceuticals and agrochemicals. Different supports have been tested with several degrees of success and multi-walled carbon nanotubes (MWCNT) represent a material that since it was first reported it has been target of intensive study for many new applications. Due to their electronic, adsorption, mechanical and thermal properties it shows a enormous potential in the catalysis field.



MWCNT were prepared by chemical vapor deposition of ethylene using Fe/Al_2O_3 as catalyst in a way described elsewhere (1). Monometallic catalysts supported on oxidized multi-walled carbon nanotubes containing 1 and ca. 3 wt% of platinum or iridium were prepared using an excess of solvent. Liquid phase hydrogenation of cinnamaldehyde took place in 100mL stainless steel autoclave at 363K and 10bar. Product distribution was monitored using gas chromatography.



Results indicate that a post-reduction thermal treatment at 973K allowed the control of the catalyst surface by removing any carboxylic groups still present after the deposition step. This thermal treatment showed a very strong effect both on activity and selectivity towards unsaturated alcohols as the metal particles remained practically unchanged. Catalysts containing 1wt% platinum showed an improvement on selectivity towards cinnamyl alcohol of almost 8 times to 63% (conversion of 50%) after 973K treatment. The effect over 2.4wt% iridium catalysts was not so pronounced but selectivities of 65% (conversion of 50%) were observed.

BFM acknowledges FCT the PhD grant SFRH/BD/16565/2004.Work supported by FCT and POCI/FEDER (POCI/EQU/58252/2004).

(1) Garcia J, Gomes HT, Serp P, Kalck P, Figueiredo JL, Faria JL, *Catalysis Today* 2005, 102, 101-109.