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Microwave-assisted deoxydehydration of glycerol to allyl alcohol

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About 10-11% (w/w) crude glycerol is generated as the main by-product of the biodiesel and oleo-chemical industries. Pure glycerol is needed in industries like personal care, food, pharmaceutical, hygiene and others. However, this crude glycerol is expensive to purify and becomes economically unviable to be used in the food, pharmaceutical or cosmetics industries. This stimulates industry and scientists to investigate for alternatives uses of glycerol and selective chemical conversions. The purpose of this study is to investigate the conversion of glycerol to allyl alcohol (AA) with the use of the microwaves and the further oxidation of the AA to acrylic acid. The conversion of glycerol to AA using formic acid (FA) was studied in a CEM discover microwave reactor using open and closed vessel conditions as well as conventional heating. Optimization of the reaction was carried out using statistical methods. The intermediate and final products were characterized using proton nuclear magnetic resonance (1H-NMR), gas chromatography (GC) and Fourier transform infrared spectroscopy (FTIR). We observed rapid conversion of glycerol to AA under microwave irradiation in the presence of FA. Particularly, the addition of FA to preheated glycerol resulted in instant conversion into AA at lower temperature and shorter time with higher purity compared to conventional heating. These initial investigations highlight that glycerol can be rapidly converted to AA at lower temperatures using microwave irradiation. These findings are important both from academic and industrial point of view. The conversion of AA to acrylic acid is in progress.

Biography

Yanet Rodriguez Herrero is pursuing her MSc at University of Alberta. Her current research is focused on "The conversion of bio-resources to produce value-added chemicals using green chemistry". She worked for few years in analytical laboratories but her desire to expand her skills and knowledge and her passion for the renewable resources inspired her to continue the chemistry studies. She always demonstrated high professionalism followed by outstanding results during her day-to day performance.

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