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## Investigation of 12-tungestophosphoric acid immobilized on zirconium modified SBA as catalyst for esterification of glycerol

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Glycerol found in animal fat, vegetable oil, and crude oil is used as a raw material in various applications such as using in cosmetics, pharmaceuticals and food industries. In spite of such a wide range of applications, the price of glycerol is decreasing noticeably. This is due to commercialization of biodiesel which lead to large amount production of glycerol as a byproduct. So, Glycerol can be counted as biomass. Because of having three hydroxyl groups, Glycerol can be converted to many value added products via chemical reactions. Among all, one of the most interesting approaches is acetylation of glycerol by acetic acid. During this reaction di- (DAG) and tri- (TAG) acetyl glycerol are produced as valuable additives for biodiesel. It has been reported that solid acid catalysts promote the acetylation reaction of glycerol. In this study, we synthesized zirconium-modified mesoporous silica (Zr-SBA) and then immobilized tungestophosphoric acid into it (Zr-SBA-PWA). Both catalysts are used in acetylation reaction of glycerol by acetic acid at 100°C. DAG and TAG are characterized as main products of the reaction. Comparison of two catalysts showed our result is unlike of many reports which explain by increasing the acidity of the catalyst the conversion efficiency of glycerol to DAG and TAG is improved. While the NH<sub>3</sub>-TPD analysis showed weaker acid properties for Zr-SBA, it exhibited better performance than Zr-SBA-PWA in acetylation of glycerol. Zr-SBA converted 100% of total glycerol, while the selectivity of reaction to DAG and TAG is nearly 90% which is an impressive achievement.



## **Biography**

Ali Reza Mahjoub received his MS degree in Organic Chemistry in 1988 and his PhD in Inorganic Chemistry in 1993 from University of Berlin, Germany. He is Professor at Tarbiat Modares University (TMU) now. His research activity covers many aspects of the synthesis, characterization and chemical-physics of metal oxides and nano oxides with particular emphasis to catalytic and photo degradation properties. His two other main interests are polyoxometalate and mesoporous silica. He has authored and co-authored more than 150 journal papers. The total citation is 2200 times and the H-index is 29.

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