

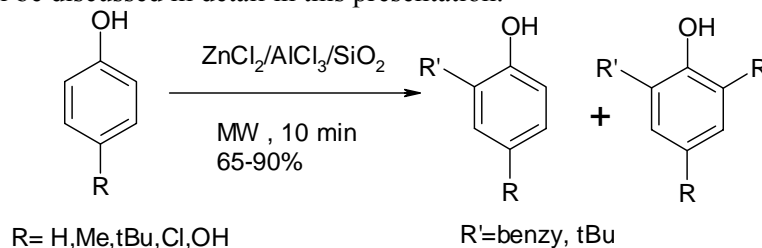
## A NEW ECO-FRIENDLY CATALYST FOR THE SOLVENT-FREE BENZYLATION AND TERT-BUTYLATION OF PHENOLS AND NAPHTHOLS WITH ALCOHOLS UNDER MICROWAVE IRRADIATION

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Alkylphenols are very valuable industrial chemicals; among which *tert*-butylated phenols find many applications. For instance, 2-*tert*-butylphenol is an intermediate for pesticide, fragrances and other products. Whereas 4-*tert*-butylphenol is used to make phosphate esters, fragrances oil field chemicals. Alkylated phenols are generally prepared by classical Friedel-Craft reaction using homogeneous acid catalyst [1], solid acidic catalyst [2] and others [3]. However, the commonly used acid catalysts pose several problems such as difficulty in separation, recovery, disposal of spent catalyst, corrosion and high toxicity, which are major environmental problems. Among them solid acids are much sought after. Heteropolyacids supported on clays, zeolites, have been found to exhibited superior activity as catalyst in comparison with other solid acids in alkylation of phenols with alcohols [4]. However, with these catalysts a long reaction time is required and the catalysts are not readily available. The coupling of microwave irradiation with the use of catalysts or mineral supported reagents, under solvent-free conditions, provide unique chemical processes with special attributes such as enhanced reaction rates, higher yields, greater selectivity and ease of manipulation. Therefore, the development of a new catalyst, which promotes the alkylation of phenol cleanly and regioselectively, is required. It appears the Lewis acids supported on a solid phase would be good alternative condition for this reaction in dry media.

Recently, we have developed a new and Eco-friendly solid acid ( $\text{ZnCl}_2/\text{AlCl}_3/\text{SiO}_2$ ), which could catalyzes many acid catalyzed organic reactions such as Fries rearrangement [5], hetero-Fries rearrangement [6] and dealkylation of arylothers [7]. The present work was undertaken to find the efficacy of this solid catalyst for the alkylation of phenols and naphthols with *tert*-butanol as well as benzyl alcohol as alkylating reagent in solvent free condition and under microwave irradiation. Thus, when various phenols and naphthols alongwith benzyl alcohol or *tert*-butanol were absorbed on the surface of the catalyst and subjected to microwave irradiation in solvent-free condition, high yield of benzylated as well as *tert*-butylated phenols and naphthols were obtained (Scheme I). All aspects of these reactions will be discussed in detail in this presentation.



( Scheme I)

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