

## **Investigation of a suitable metal catalytic system for the aldol reaction between acetophenone and benzaldehydes**

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This study was aimed at finding an efficient metal ion catalytic system for the aldol reaction because waste generation in the conventional aldol reaction under standard condition is very high. The aldol reaction between aryl aldehydes (benzaldehyde, *p*-Br-, *p*-Me- and *p*-OMe- benzaldehydes) and ketones (acetone, cyclohexanone and acetophenone) was carried out with a catalytic amount of a metal salt (10% w/w) under refluxing conditions in different solvents. Of the metal salts used *viz* FeCl<sub>3</sub>, ZnCl<sub>2</sub>, TiO<sub>2</sub> and AlCl<sub>3</sub>, FeCl<sub>3</sub> performed as the best catalyst for the aldol reaction between *para*-tolualdehyde and acetophenone. Among the three solvents (EtOH/ H<sub>2</sub>O, CH<sub>2</sub>Cl<sub>2</sub> and dioxane) examined, a mixture of EtOH and H<sub>2</sub>O was found to be the best solvent system. Several ligands *viz* ethylenediamine, PPh<sub>3</sub>, pyridine, aniline in different ratios were added to the reaction mixture to improve the yield of the aldol reaction catalysed by FeCl<sub>3</sub>. Among them ethylene diamine with FeCl<sub>3</sub> in 1:3 ratio gave the best catalytic system. In addition, iron (III) catalysed aldol reactions carried out at 100°C produced the best yields in 3 hours. Final products were analysed by thin layer chromatography and compared with authentic samples. In conclusion, 10% FeCl<sub>3</sub>, 30% ethylenediamine in EtOH/ H<sub>2</sub>O solvent system was found to be the optimum condition for the aldol reaction and the highest yield of 35% was obtained for the reaction between acetophenone and *para*-tolualdehyde under this new unconventional condition with little or no waste.

**Keywords:** *Aldol reaction, FeCl<sub>3</sub>, ethylenediamine, EtOH/H<sub>2</sub>O, catalyst*

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