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BENZYLTRIETHYLAMMONIUM CHLORIDE - ZINC-METHANOL : A NOVEL SYSTEM FOR SELECTIVE REDUCTION OF ALDEHYDES TO ALCOHOLS

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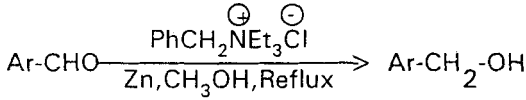
A selective reduction of aldehydes to alcohols using benzyltriethy lammoniun chloride - zinc - Methanol System is done.

Zinc - ammonium chloride - H_2O system[1] has been used for reduction of nitro compounds to corresponding hydroxyl amines. There is no report of reduction of aldehydes or Ketones using quaternary ammonium salts. Benzyltriethylammoniun chloride- Zinc- Methanol System was found to be novel, efficient and selective which reduces only aldehydes and not ketones in good yields. we also attempted the reduction of aldehyde in presence of ketone using this system and succeeded in getting only primary alcohol and not the secondary alcohol at all showing the selectivity. This system also failed to reduce nitro group (entry 7-9) and carbon-carbon double bond. (entry-10)

The following alcohols (entry 1-10) were prepared in the laboratory (see table). The progress of the reaction was monitered by thin layer chromatography and produts were characterised by m.p./ b.p., IR and PMR spectra.



Table

Sr. No.	Aldehyde / Ketone	Time hr.	Yield (%)	B.P./M.P. Obs.	(^{0}C) Lit
1.	Benzaldehyde	4	90	204	205
2.	Anisaldehyde	6	86	257	259
3.	Salicyaldehyde	6	95	83*	82*
4.	Furfuraldehyde	6	87	168	170
5.	p-(-NMe_2) Benzaldehyde	5	58	64*	65*
6.	p-chlorobenzaldehyde	5	84	71*	72*
7.	p-Nitrobenzaldehyde	6	80	64*	65*
8.	o-Nitrobenzaldehyde	5	53	70*	71*
9.	m-Nitrobenzaldehyde	4	70	32*	32*
10.	Cinnamaldehyde	6	90	250	250
11.	Cyclopentanoe	15	NR		
12.	Cyclohexanone	15	NR		
13.	Acetophenone	15	NR		
14.	Benzophenone	15	NR		
15.	p-Bromobenzophenone	15	NR		

* M.P. = Melting point NR = No Reaction

EXPERIMENTAL

General Procedure for reduction :

A mixture of benzaldehyde (10 mmole), Zinc dust (40 mmole) and Benzyltriethyl ammonium chloride(20 mmole) was taken in methanol

(30 ml) and refluxed on water bath (4 hr, monitered by TLC). The solvent was removed under reduced pressure and residue obtained was extracted with ether (3 x 25 ml). The combined ether layer was washed with water (3 x 25 ml) and dried over anhydrous sodium sulphate. The ether was removed under reduced pressure to furnish benzyl alcohol (90 %, b.p. 204^0) IR (KBr : 3300, 1500, 1460 cm^{-1}; PMR ($CDCl_3$) ; δ 2.8 (s,1H); 4.63 (s,2H); 7.44 (s,Ar-5H).

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