Table 1 *Reactions of phenolic substrates with CAN and their products*

Substrate	Solvent	Reaction conditions	Product	Yield %
I	Acetonitrile	20°, 0.5 hr	Benzoquinone	60
II	Acetonitrile: water (2:1)	20°, 1.5 hr	Benzoquinone	70
III	Methanol: aceticacid (1:1)	60°, 4 hr	IV	40
			V	50

reaction is completed the mixture was diluted with ice cold water and exhaustively extracted with ethyl acetate. The organic extract was then concentrated and subjected to column chromatography over silica gel using petroleum ether, benzene and ethyl acetate either alone or in binary mixtures and the products obtained in pure state were identified by comparison with authentic samples.

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1. Chawla, H. M. and Chakrabarty, K., *Indian J. Chem.*, 1985, **B24,** 1277.
2. Chaudhuri, K. and Chawla, H. M., *Indian J. Chem.*, 1986 (in press).

POLYMER SUPPORTED REAGENTS: A SIMPLE AND EFFICIENT METHOD FOR BENZOYLATION OF PHENOLS

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THE synthesis of benzoyl ester has many uses in organic chemistry. A majority of benzoyl esters are solids and as such, they provide a useful means of characterizing phenols.

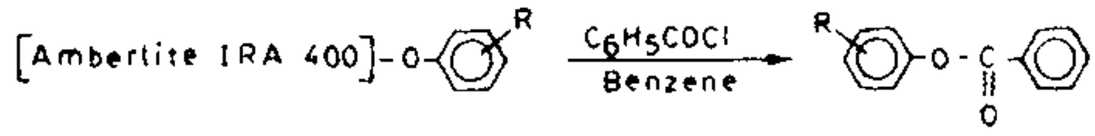
Benzoyl ester may be prepared according to the traditional method by treatment of phenol with benzoyl chloride in presence of alkali; however if benzoyl ester is soluble in alkali, it requires tedious reaction work-up resulting in low yields[1].

The reagents supported on insoluble polymers have found wide application during the last decade in various fields, particularly, in organic synthesis[2]. In continuation of our work on polymer supported reagents[3–5] and in view of the importance of benzoyl esters as a protecting group[6–8], a simple and efficient method is now reported for the synthesis of the same in quantitative yield and purity under mild reaction conditions in nonaqueous medium.

This method has the advantage of higher yields and simplicity of performance. This method is inexpensive as the resin could be used repeatedly and it can be regenerated to its initial activity by treatment with hydrochloric acid. Reaction with catalytic amount of the resin does not give satisfactory results. Thus, the nucleophilicity of the polymer-bound phenoxide ion is increased sufficiently to allow the reaction with benzoyl chloride in a manner which is related to the principles of phase transfer technique with low molecular catalysts. Representative substituted phenoxides are summarized in table 1.

Typical procedure for the preparation of polymer supported phenoxide:- Commercial, strongly basic anion exchange resin in chloride form [Amberlite IRA-400 (Cl^-)] packed in a column is washed with 0.25 N aqueous sodium salt of phenol until complete removal of chloride ion. The resin is then successively washed with water and ethanol and is finally dried in vacuum at 50°C over P_2O_5 for 10 hr. The exchange capacity is determined by passing aqueous 1 M sodium chloride solution (100 ml) through the resin (0.3 g) in a column. The amount of phenoxide in the eluent is titrated with

Table 1 *Benzoyl ester*



Phenol	Yield (%)
Phenol	95
o-Cresol	92
p-Cresol	92
o-Nitrophenol	91
p-Nitrophenol	95
o-Chlorophenol	95
p-Chlorophenol	95
β-Naphthol	90
4-Methyl-7-Hydroxycoumarine	90
Methyl salicylate	90
Ethyl salicylate	90
Methyl *p*-hydroxybenzoate	90

0.01 N hydrochloric acid using methyl orange as an indicator.

A typical procedure for synthesis of benzoyl ester of phenol: Amberlite IRA-400 phenoxide form (5 g; capacity 1 mmol phenoxide anion/g of dry resin) in benzene (15 ml) is refluxed with benzoyl chloride (5.01 mmol) for 4–5 hr. The progress of the reaction was monitored by thin layer chromatography. After completion of the reaction the resin was removed by filtration and washed with benzene. Removal of the solvent by distillation gives the corresponding benzoyl ester in almost pure form and in high yield. The products were characterized by NMR, IR and samples.

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1. Vogel, A. I., *A text book of practical organic chemistry*, Longman Group Limited, London, 1975, p. 652.
2. Lenzoff, C. C., *Chem. Soc. Rev.*, 1974, **3**, 65; McKillop, A. and Young, D. W., *Synthesis*, 1979, 401 and 1979, 481; Akelah, A. and Sherrington, D. C., *Chem. Rev.*, 1981, **81**, 557.
3. Sande, A. R., Jagdale, M. H., Mane, R. B. and Salunkhe, M. M., *Tetrahedron Lett.*, 1984, **25**, 3501.
4. Deshmukh, J. G., Jagdale, M. H., Mane, R. B. and Salunkhe, M. M., *Syn. Comm.*, 1986, **16**, 479.
5. Bandgar, B. P., Jagdale, M. H., Mane, R. B. and Salunkhe, M. M., *Indian J. Chem.*, 1985, **B14**, 1057.
6. Gates, M., *J. Am. Chem. Soc.*, 1950, **72**, 228.
7. Pratt, D. D. and Robinson, R., *J. Chem. Soc.*, 1922, 1579.
8. Robertson, A. and Robinson, R., *J. Chem. Soc.*, 1927, 1710.

NOVEL INHIBITION OF LDH ISOENZYMES BY *CLEISTANTHUS COLLINUS* TOXINS

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CLEISTANTHUS COLLINUS (Roxb) Benth and Hook f (Family: Euphorbiaceae) is a highly poisonous plant. Many parts of the plant are reported to be toxic and an extract of crushed leaves is commonly used as a suicidal, homicidal, cattle and fish poison and for procuring criminal abortion[1–3]. A glycosidic oduvin was isolated from the plant leaves and reported to be poisonous[4]. Isolation and structural elucidation of certain toxic lignan lactones including cleistanthin A, cleistanthin B, diphyllin and collinusin have been reported[5–7]. Spectrofluorometric and solid state fluorodensitometric quantitation of the toxic components of *C. collinus* was developed[8,9]. While information on the toxic constituents is available, data on toxicological effects and the mode of action of *C. collinus* leaf extract as such are very limited. Recently, the effect of *C. collinus* toxins on muscle function has been reported[10]. The present investigation deals with the peculiar alterations of lactate dehydrogenase isoenzymes (rabbits) during *C. collinus* toxicity.

Rabbits weighhng 1–1.5 kg were housed in separate cages and fed with commercial rabbit feed obtained from M/s. Hindustan Lever (India) Ltd. Food and water were given *ad libitum* throughout the experimental period. Leaves of *C. collinus* were washed and crushed with water. Residue was removed by centrifugation and the supernatant used for toxicological studies. Sublethal dose (1.4 g of leaf/kg body weight) was assessed and injected intravenously to rabbits. The control rabbits received only distilled water.

After 72 hr the test rabbits were sacrificed along with their respective controls and the blood samples were collected and the serum separated. Tissues of kidney, liver and heart were removed and homogenized in 0.1 M tris-HCl buffer (pH 7.5). The tissue homogenates and the serum were used for the enzyme assay and isoenzymes separation by polyacrylamide gel electrophoresis.

LDH enzyme assay was carried out according to the method of King[11]. Tissue protein was estimated following the method of Lowry *et al*[12]. Ornstein's method was adopted for the separation of isoenzymes on polyacrylamide gel[13]. The separated isoenzymes were stained for the enzyme activity using the procedure of Dietz *et al*[14].

The values of serum and tissue LDH activity are presented in table 1. When *C. collinus* extract was injected into rabbits, the serum as well as tissues LDH activity was markedly lowered as compared with the controls. Kidney showed a maximum decrease of 25.34%. The decrease observed in liver and heart was 21.08% and 16.54% respectively in comparison with controls. Serum elicited 20.31% decrease in the enzyme activity.