

SYNOPSIS

The thesis entitled, "APPLICATION OF FUNCTIONAL POLYMERS IN ORGANIC SYNTHESIS" consists of three chapters and embodies accounts of : Chapter 1 - A survey on the applications of some polymer supported reagents in organic synthesis; Chapter 2 - Borohydride exchange resin : Selective reduction of aliphatic carboxylic acids; Chapter 3 - Preparation and applications of spacer borohydride exchange resin.

The thesis begins with the fundamental aspects pertaining to functionalized polymers like definition and classification of polymers, structure, preparation and properties of functionalized polymers, concepts and characteristics of polymeric reagents, types of supports and also advantages and disadvantages in the use of functionalized polymers are discussed in Chapter-1. Significant applications of polymer supported reagents in the field of organic synthesis are also summarised.

Chapter-2 deals with the preparation of borohydride exchange resin (BER) from commercially available anion exchange resin Amberlyst A-26 (SCHEME-1), and its use in the selective reduction of aliphatic carboxylic acids in presence of aromatic carboxylic acids (SCHEME-2). The aliphatic carboxylic acids were reduced to corresponding

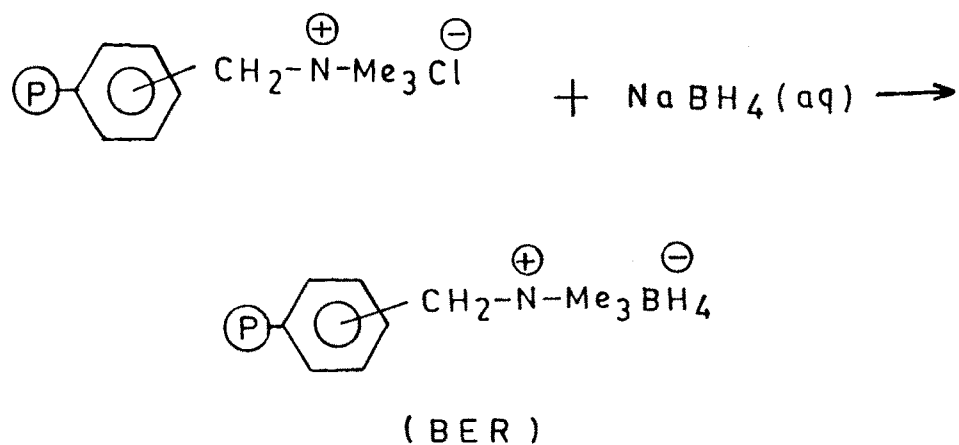
alcohols in high yields within 30 min. However no reduction was observed for aromatic carboxylic acids even after longer reaction time and at reflux temperature. The effect of solvent and effect of anion exchange resin on rate of reduction is also discussed.

Chapter-3 describes the procedure for the preparation of spacer borohydride exchange resin starting from crosslinked (2%) chloromethylated polystyrene (SCHEME-3), it's capacity determination and it's applicability for the reduction of carbonyl compounds to corresponding alcohols in high yields. The spacer borohydride exchange resin reduces aldehydes and ketones in methanolic solutions with ease both by column as well as batchwise process (SCHEME-4), which is the key feature of reaction. The reaction was carried out by increasing steric bulk at nitrogen atom of the spacer borohydride exchange resin to study the effect of steric hinderence on the rate of reduction.(SCHEME-5). The effect of solvent on rate of reduction, and the stability and shelf life of the polymeric reagent have also been studied. The polymeric reagent can be used repeatedly since it can be regenerated to it's initial activity by treating it with aqueous sodium borohydride solution.

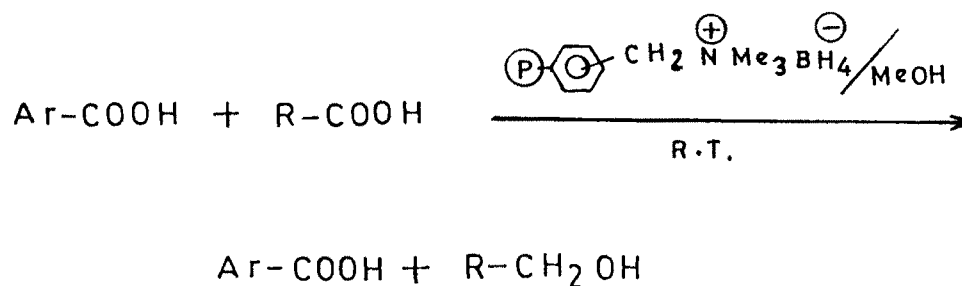
The work comprising in this thesis has been published in following journals.

- (1) Borohydride Exchange Resin : Selective Reduction of Aliphatic Carboxylic Acids.
Indian Journal of Chemistry, 32B, 1201 (1993).
- (2) Preparation and Applications of Spacer Borohydride Exchange Resin.
(Communicated).

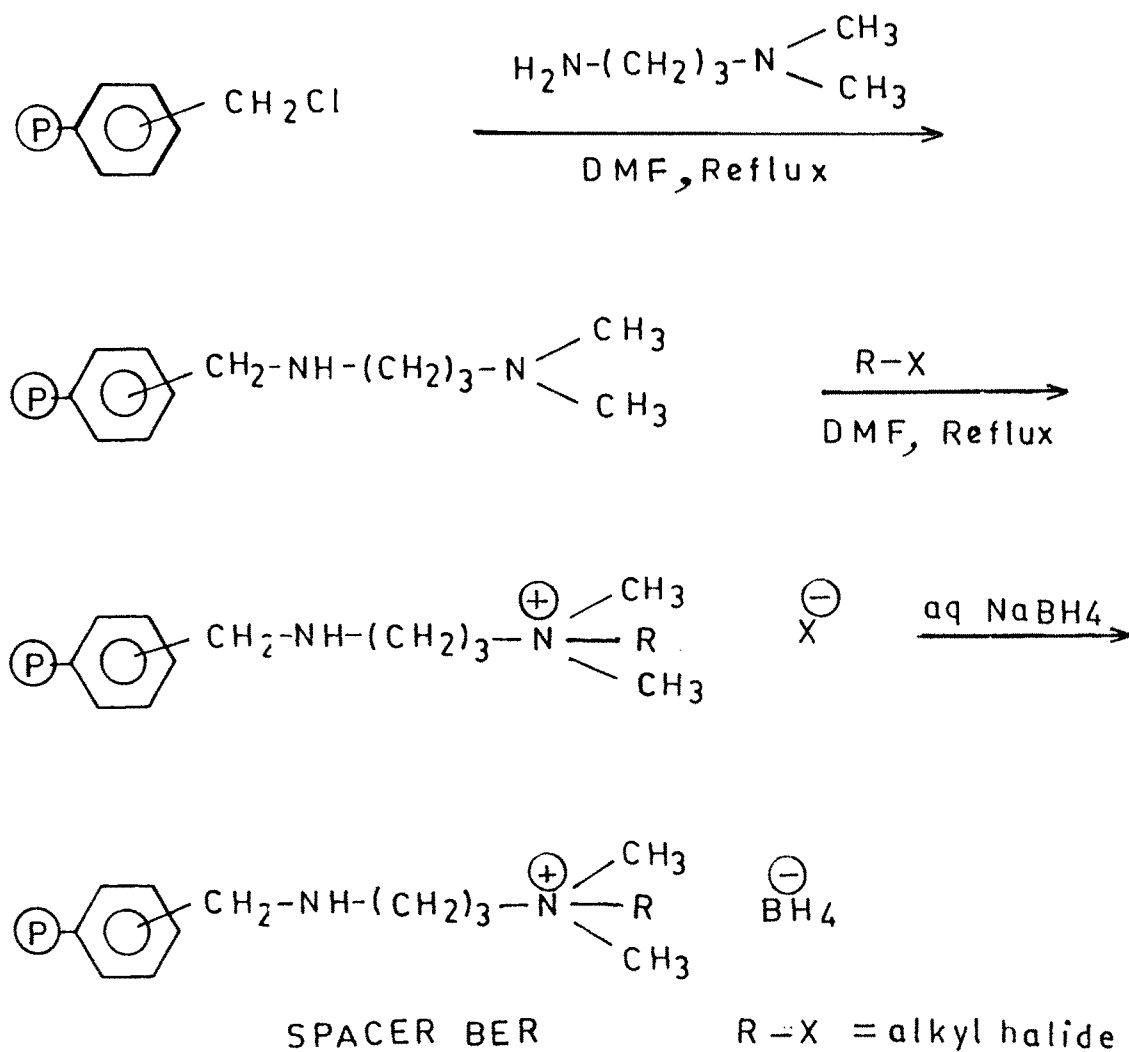
SCHEME-1 : PREPARATION OF BER FROM ANION EXCHANGE RESIN.



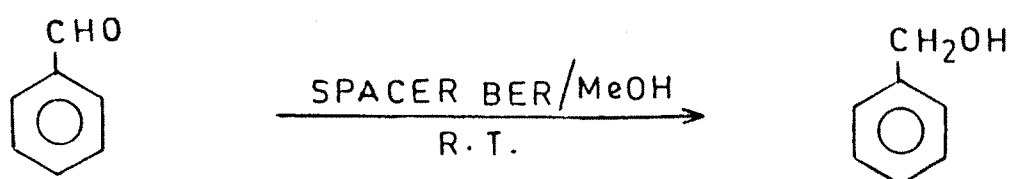
SCHEME-2 : SELECTIVE REDUCTION OF ALIPHATIC CARBOXYLIC ACIDS IN PRESENCE OF AROMATIC CARBOXYLIC ACIDS WITH BER.



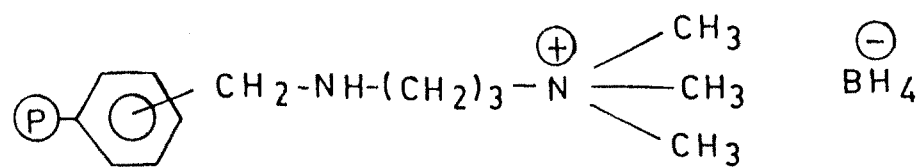
SCHEME-3 : PREPARATION OF SPACER BER FROM (2%)
CROSSLINKED CHLOROMETHYLATED POLYSTYRENE .



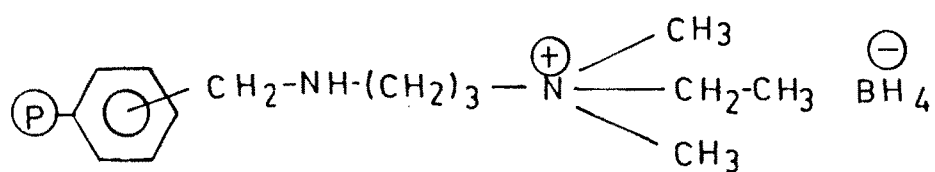
SCHEME-4 : REDUCTION OF BENZALDEHYDE TO
BENZYL ALCOHOL WITH SPACER BER .



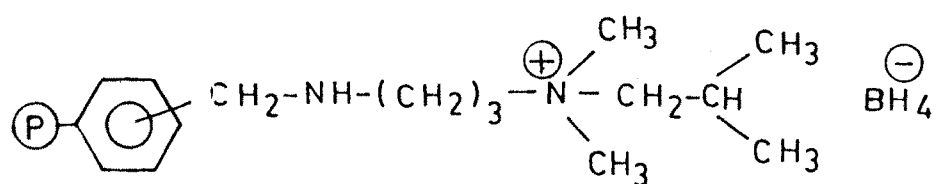
SCHEME-5 : STRUCTURES OF SPACER
BER PREPARED.



SPACER BER (A)



SPACER BER (B)



SPACER BER (C)