APPLICATIONS OF CELLULOSIC ION EXCHANGERS

A thesis presented in partial

fulfilment of the requirements

for the degree of

Master of Science

in Chemistry

at

Massey University

New Zealand

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1983

ABSTRACT

Two possible commercial applications for a new range of ion exchanger, based on regenerated cellulose were investigated.

Equilibration studies showed that strongly basic (QAE) and strongly acidic (SP) derivatives can be equilibrated quicker and more easily than weakly basic (DEAE) and weakly acidic (CM) derivatives. This makes QAE and SP derivatives those of first choice, for use in commercial ion exchange processes.

The new QA and DE Cellulose derivatives were investigated for their possible use in the commerical purification of rennet. It was found that they were unable to bind rennet with sufficient capacity, within it's pH stability limits, to be of any use in this process. This finding was surprising at first since these new ion exchangers showed improved BSA adsorption capacities over those currently employed for rennet purification. An explanation for this low capacity was proposed and verified with model studies on BSA adsorption. From these model studies it was also found that the new DE Cellulose has a more even distribution of charged groups resulting in sharper and more symmetrical peaks in the elution profiles of BSA, than those obtained from some DEAE celluloses commercially available.

The new QA Cellulose was investigated for it s possible use in the commercial extraction and purification of heparin, but was found to have insufficient density of charged groups to bind heparin at the high ionic strength used in some extraction processes. Several reaction schemes were devised and used to produce quaternary ammonium cellulose derivatives containing groups with two or three positively charged nitrogens as a means of increasing the charged density on the cellulose to match repeating negatively charged sulphate groups in heparin. The products obtained showed a dramatic increase in their binding strength for heparin but unfortunately there was a decrease in their capacity for heparin. None the less several potentially useful new cellulose derivatives for ion exchange chromatography can now be made.

ACKNOWLEDGEMENTS

I wish to thank my supervisor, Dr. J.S. Ayers for the help he has given me throughout the course of this study.

I would also like to thank all members of the Chemistry-Biochemistry Department for their help.

Thanks also is extended to Mrs Stewart, Susan Hewitt and Janine Atkins for their assistance in preparing this text and to Jenny Trow for her assistance in preparing the diagrams.

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