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NATURAL AND SYNTHETIC POLYMERS: CHARACTERIZATION OF ACID-BASE BEHAVIOUR AND BINDING PROPERTIES

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Natural and synthetic polymers are employed in different fields, as thickening, dispersing, suspending, and emulsifying agents in pharmaceuticals, cosmetics, paints, industrial formulations and in medical applications such as gels for skin care or skin disease treatment products. The polymers are inexpensive, safe and available in a variety of structures with different characteristics. A wide number of derivatizable groups and of molecular weights, varying chemical composition of these polymers also provide opportunities in drug delivery of therapeutic agents. The polyelectrolytes reported in this study are: polyethylene glycole (PEG), Acusol 445 (homopolymer of acrylic acid), carboxymethylcellulose (CMC) and Carrageenan. The characterization of the acid-base behaviour of the different polymers were studied in $NaNO_3$ aqueous solutions, at I = 0.15 mol dm^{-3} and T = 298.15 K. In the calculation of the protonation constants, a simplified approach was used, treating a polyelectrolyte like a simple low molecular weight ligand defining a minimum number of protonation sites necessary to extensively describe the system. The binding ability of the polymers towards two different metal cations, Zn^{2+} and Sn^{2+} was studied in $NaNO_3$ aqueous solutions at I = 0.15 mol dm^{-3} and T = 298.15 K. The speciation models of the different systems were compared among them and sequestering ability of these polyelectrolytes was evaluated by means the empirical parameter pL_{50}.

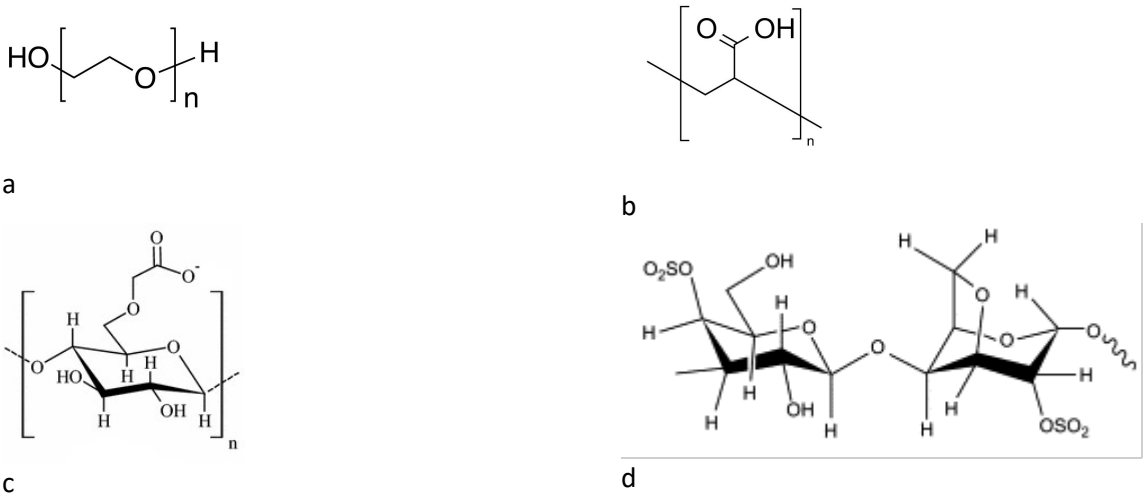

Figure 1. Structure of the polymers: a PEG, b Acusol 445, c CMC, d Carrageenan.