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Application of chemical analysis methods in characterization of drug delivery systems and determination of degree of substitution

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The present presentation has designed to investigate the chemical analysis approaches to determine the degree of substitution with the emphasis on the ^{1}HNMR application.

A polymeric backbone of a drug delivery system can be substituted in different degrees, dependent upon the conditions, steps and duration of the synthesis reaction. The degree of substitution is expected to play an important role on the properties of drug delivery system, for example, to increase the permeability through the intestinal epithelia, special care has to be taken to study the toxicity of these systems and to differentiate the enhancing effect from possible toxicity properties.

Regarding to this point of view, the ratio of substitution on a polymeric backbone can be a key factor in controlling the wide variety of properties such as solubility, particle forming, size, zeta potential, surface tension, toxicity, drug loading, drug releasing and other important features of a drug delivery system. thus, determination of the DS of polymeric backbone is an important as it provides information about the substitution may seriously affect the properties in various applications.

A number of methods can be used to determine the average DS for a modified polymer comprising ^{1}H NMR, ^{13}C NMR, FTIR, CHNS analysis, GC/MS, Electrospray mass spectroscopy, UV spectroscopy, Reverse-phase HPLC, TG-DTG, DSC, …

Among these mentioned methods ^{1}H NMR, FTIR and CHNS analysis are the most applied methods for this goal, due to the large amount of information helping characterization and determination of chemical bonding in a designed systems.

This presentation can provide valuable information around the determination of degree of substitution in a wide range of drug delivery systems with the aim of concentration on FTIR, ^{1}HNMR and CHNS approaches.