

论文

高碘酸钠氧化法测定羟丙基瓜尔胶上仲羟基取代度

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摘要:

高碘酸钠氧化可以使邻羟基C—C键发生高选择性断裂, 同时产生两分子醛基. 在pH=4.3及25 °C的条件下, 对瓜尔胶及其衍生物羟丙基瓜尔胶进行高碘酸钠氧化, 采用红外光谱与核磁共振谱对氧化产物结构进行了表征. 结果表明, 氧化后的瓜尔胶和羟丙基瓜尔胶结构中醛基主要以半缩醛的形式存在. 通过测定高碘酸钠的消耗量得到不同摩尔取代度羟丙基瓜尔胶糖单元上邻羟基的含量, 结合概率分析方法, 确定摩尔取代度分别为0.04, 0.14, 0.36, 0.51, 0.78, 1.05和1.53的羟丙基瓜尔胶在仲羟基上取代度分别为0.02, 0.09, 0.18, 0.30, 0.46, 0.59和1.03, 与其它方法得到的结果一致.

关键词: 高碘酸钠; 瓜尔胶; 羟丙基瓜尔胶; 仲羟基取代度

Determination of the Degree of Substitution at Secondary Hydroxyls of Hydroxypropyl Guar Gum by Periodate Oxidation

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Abstract:

Periodate oxidation of vicinal hydroxyls is a highly selective reaction which leads to the cleavage of the C—C bond and formation of dialdehyde groups. The reactions of periodate with guar gum(GG) and hydroxypropyl guar gum(HPG) were investigated at pH=4.3 and 25 °C and the oxidized products were characterized with IR and NMR. The results show that aldehyde groups in oxidized GG and HPG are in the form of hemiacetal structures like other polysaccharides such as starch and cellulose. The oxidation degree and the content of vicinal hydroxyls in GG and HPG were determined by the consumption of periodate(P_t) and the degree of substitution at the secondary hydroxyls(DS_{S-OH}) of HPG was calculated by probability analysis. The results of HPGs with different molar substitution of 0.04, 0.14, 0.36, 0.51, 0.78, 1.05 and 1.53 are 0.02, 0.09, 0.18, 0.30, 0.46, 0.59 and 1.03 respectively, which are in good agreement with the values found in the literature by other methods. Other polysaccharides, such as methyl cellulose also gave good results on the values of by the method of periodate oxidation.

Keywords: Sodium periodate; Guar gum; Hydroxypropyl guar gum; Degree of substitution of secondary hydroxyl

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