P6.11. NANOCOMPOSITES BASED ON NATURAL POLYSACCHARIDE AND CLAY MINERALS

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In recent years there has been a growing effort to develop new biodegradable materials from environmentally friendly and renewable resources whose feasibility in suiting their properties to a particular application can result in easily tailored composite materials. The utilization of natural polymers such as starch, lignin, cellulose, and proteins in the plastics industry is considered a viable approach to reduce surplus agricultural products and to develop biodegradable materials.

Information on organic nanocomposites, which are based on polymers, cellulose fiber reinforced, first appeared in [1].

Noted that fiber reinforcement exhibit not only mechanical (tensile strength, elastic modulus, etc.) and improving the physical properties (the best barrier performance, reduce fire risk), but more and better optical penetration.

Starch has been used as matrix for nanocomposites, in which the quality of nanoparticles as fillers, using share dispersed minerals, specifically clay minerals [2].

This paper presents results of the formation of nanocomposites based on starch and dextrin of clay minerals—glauconite, is a layered silicate with the original radial layered structure. Shares of these minerals have rounded shape and be more prone to the formation of composites than the minerals plate with layered structures.

Study the influence of polysaccharide concentration of the filler dispersion and temperature on rheological characteristics of aqueous dispersions of these compounds. Found that adding minerals to the polysaccharide solution leads to an increase in their viscosity. This is especially felt when heated to a temperature such dispersions 60–70°C. Concluded that this behavior of solutions associated with conformational transition of polysaccharide molecules. At certain elevated temperatures lost spiral configuration of their molecules, resulting in increased adsorption capacity. This explains the effect of the formation of stable gels dextrin–glauconite, as well as increased adsorption capacity of clay minerals to macromolecules in complex natural solutions that to clean.

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2. Chen B., Evans J.R.G. Thermoplastic starch – clay nanocomposites and their characteristics. Carbohydrate Polym., 2005, v.16, pp. 2334 – 2337.