Results confirmed the Newtonian rheological behavior of inverted liquid sugar for irradiated and control samples. Viscosity varied from 2799 ± 15 cP (for control) to 2918 ± 16 cP (for 50 kGy). Irradiated samples at 5 kGy and 10 kGy presented lower values than control, being respectively 2507 ± 18 cP, that could represent a potential break of sugar molecules. Indeed, irradiation can lead to a breakage of molecules of sucrose with release of glucose and fructose and still, the break of this monosaccharide with formation of compounds containing chains of six or less carbons. Samples irradiated at 20 kGy and 30 kGy presented viscosities close to the control ones. Samples irradiated at the higher dose obtained the highest viscosity average (2918 ± 16 cP), that could show a possible grade of polymerization. This latter became with an intense color after irradiation.

Anyway, the alterations due to irradiation were lower than the viscosity range encountered in different batches of sugar. This indicates that irradiation by electron beam did not impair the rheological properties that are essential in designing pumps, valves and equipments for processing facilities.

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Changes in Physicochemical, Morphological and Thermal Properties of Electron-Beam Irradiated Ethylene–Vinyl Alcohol Copolymer (EVOH) as a Function of Radiation

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In the present work the changes in physicochemical, morphological and thermal properties of electron-beam irradiated ethylene–vinyl alcohol copolymer (EVOH) resin and EVOH resin reinforced with piassava (Attalea funifera Mart) fiber as a function of radiation dose were investigated. The EVOH resin was irradiated up to 90 kGy using a 1.5 MeV electron beam accelerator, at room temperature in presence of air. The changes in properties of the EVOH resin and of the reinforced EVOH resin after irradiation were investigated using scanning electron microscopy (SEM), differential scanning calorimetry (DSC), thermogravimetric analysis (TGA) and sol-gel analysis. The correlation between the properties of the EVOH resin and of the EVOH resin reinforced with piassava fiber, both irradiated and non-irradiated sample, were discussed.

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Radiation Induced Modification of Silica And Fillosilicates for Rubber-Fillers Composites with Enhanced Compatibility and Radical Reactivity

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Ionizing radiations have been used for modifying the surface properties of silica based fillers by grafting polybutadiene olygomers . The materials were found to have enhanced compatibility with elastomer matrices and are now being tested for sulphur and radiation induced vulcanization with the expectation of obtaining improved yield of chemically bound rubber and enhanced reinforcement mechanism. The modified silica samples were characterized by Inverse Gas chromatography (surface energy properties), granulometry, FTIR and Raman spectroscopy; the mechanism of the grafting reaction was exploited by matrix EPR spectroscopy. Under irradiation the initiating paramagnetic centres are generated prevalently within the silica matrix but rapidly migrate at the surface where the reaction with the organic coating takes place. This process is characterized by a low activation energy since experiments performed with samples irradiated at 77K and subsequent stepwise warming up to room temperature have shown that the silica species disappear giving rise to the polybutadiene crosslinking radical between 77K and 110K.