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Liquid crystal (LC) behavior of cinnamyl 2, 3, 4, 6-tetra-O-acetyl-α-D-glucopyranoside

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Carbohydrates are a new, but promising source for liquid crystals. But they are different from classical monophilic liquid crystals. They have many interesting non-technical applications like being used as surfactants, emulsifiers, membrane builders' etc. carbohydrate LCs mainly consist of a polar sugar moiety and a non polar part. Thus, they possess an amphipathic property which imparts the liquid crystal behavior and surfactant properties to carbohydrate derivatives. In this paper, starting from glucose and cinnamyl alcohol, novel aryl glycosides has been synthesized. It was done by the selective acylation of D-glucose with an acylating agent, aceticanhydride followed by glycosilation with cinnamyl alcohol and followed by the investigation of liquid crystal properties of both the acetylated and the deacetylated products. These products have been structurally elucidated using standard spectroscopic techniques like hydrogen (^{1}H) NMR, carbon-13 (^{13}C) NMR, Mass spectroscopy and FTIR. Their thermotropic and lyotropic liquid crystalline properties were investigated using polarizing microscopy, differential scanning calorimetry and X-ray diffraction. Both thermotropic as well as lyotropic polymorphism was found for cinnamyl 2,3,4,6-tetra-O-acetyl-α-D-glucopyranoside. The compound displayed thermotropic hexagonal columnar/ smectic A phase and the investigation of the lyotropic phase behaviour led to the observation of hexagonal columnar Phase. The results of the single-crystal X-ray analysis provided for a better understanding of crystal formation and stability.

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