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Intermolecular interactions of nicotine with biomolecules to optimize and develop extraction formulations moderated through physicochemical properties at 303.15 K

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Abstract: The nicotine (NT) is an addictive substance and most common continuous consumption is from smoking cigarettes and dip chewing tobacco. The removal of excess NT is possible through molecular interaction mechanisms by using active molecular functional moieties. In this context, the physicochemical properties (PCPs) such as density (ρ, ±10−3 kg m−3), viscosity (η, ±10−4 mPa·s), surface tension (γ, ±0.01 mN m−1), friccohesity (σ, ±10−5 s·m−1), activation energy (Δμ2*, ±10−2 kJ mol−1) and molecular radii (r, ±0.01 nm), and acoustic study of intermolecular interactions of NT with glutamic acid (GA), ascorbic acid (AA), citric acid (CA), dextrose (DX), and honey (HN) prevailing in aqueous solution have been reported at 303.15 K. These PCPs revealed that the intermolecular hydrogen bonding (IHB) occurs between nitrogen (N) atom in pyridine moieties and GA, AA, CA, DX, and HN molecules in presence of water (W) for the reorientations of the two NT rings. The increasing concentration of NT with aqueous GA, AA, CA, DX, and HN, the PCPs also increases. Hence, PCPs data demonstrate that maximum HB interactions (HBI) between pyridine moieties and these all molecules increases with increasing concentration of NT in aqueous medium. These physicochemical characterizations of the structural dynamics with NT are attributed to the different structures of GA, AA, CA, DX and HN molecules around the pyridine ring moieties of NT.

KeyWords: Physicochemical, properties, Nicotine, Amino acids, Honey, Molecular interaction, Extraction

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