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Exploring cocrystallization of curcumin

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Curcumin is an active pharmaceutical ingredient (API) present in the Indian spice turmeric, Curcuma longa. Among the several solid-state properties of an API, dissolution has an immediate effect on its bioavailability. Inspite of its medicinal properties, curcumin has very low aqueous solubility. Efforts have been already made for increasing solubility and bioavailability of curcumin by preparing various solid forms. In this work attempts have been made to investigate cocrystallization of curcumin with various coformers. The work focused on understanding curcumin cocrystallization with coformers namely N-acetyl D, L-Tryptophan, tyrosine, glycine, biotin, paracetamol, carbamazepine, ibuprofen, folic acid, suberic acid, succinic acid, ethyl paraben and dextrose. The coformers chosen belong to different categories like amino acids, API, acids and sugars. Binary Phase diagrams were constructed for the investigated systems. The relationship between melting point and dissolution properties has been analyzed in detail. With the obtained phase diagrams, attempts have been made to correlate the dissolution properties of each system with curcumin. Cocrystallization of curcumin with ethyl paraben (Eutectic melting temperature: 110.3 °C) and succinic acid (Eutectic melting temperature: 154.2 °C) resulted in formation of eutectic mixtures whereas with ibuprofen and dextrose, curcumin resulted in a physical mixture. In depth understanding of the explored systems are being developed by characterizing the physical mixtures, eutectic mixtures or cocrystals by FTIR analysis, solid-state NMR and single crystal X-RD analysis. This will be followed by investigating the extent of dissolution achieved by the solid forms. This kind of thorough investigation will enable us to fine-tune the solubility of curcumin by choosing structurally-related coformers that can potentially enhance solubility of curcumin.

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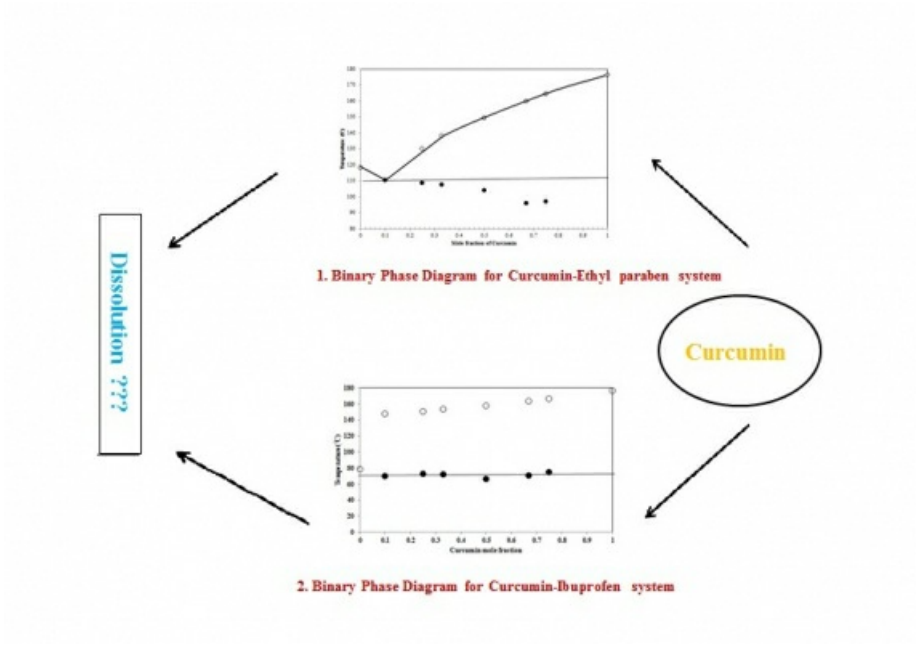

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