

## Crystal habit modification of meloxicam utilizing different alcoholic solvents and crystallization conditions

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**Background and Aims:** Crystallization is usually employed for the purification of active pharmaceutical ingredients. Use of different solvents and processing conditions may alter the crystal habit. The aim of the present investigation was to achieve an ideal crystal habit, good wettability and rapid dissolution rate of meloxicam, a poorly water-soluble non-steroidal anti-inflammatory drug, using different solvents and crystallization conditions.

**Methods:** Meloxicam crystals were prepared by recrystallization from methanol, ethanol and n-propanol solutions under different conditions (rapid and slow cooling as well as solvent change method). Physical characterization of the obtained crystals was carried out for identification of polymorphism by X-ray powder diffraction (XRPD) and fourier transform infrared spectroscopy (FT-IR), the morphology of crystals using scanning electron microscope and thermal analysis using differential scanning calorimetry (DSC). Mean particle size, contact angle and dissolution rate of crystals were also studied.

**Results:** According to the XRPD, FT-IR and DSC studies, no polymorphic change was occurred during crystallization. It was found that cooling slowly produced polyhedral prismatic crystals, while the intact drug and crystals obtained by other methods were irregular and plate-like, respectively. Particle size had been reduced in crystals prepared by solvent change method. ( $p < 0.05$ ) Contact angle analysis revealed that wettability of all produced crystals, except prepared crystals in methanol under rapid and slow cooling, had been higher than untreated meloxicam. ( $p < 0.05$ ) Moreover, enhancement dissolution rate has been achieved in crystals produced from n-propanol (under all 3 conditions) and ethanol (under rapid cooling and solvent change method).

**Conclusions:** Meloxicam dissolution rate and wettability was improved significantly by habit modification in the presence of alcoholic solvents as crystallization medium.

**Keywords:** Meloxicam; Crystal habit; Dissolution