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STABILITY OF CO-AMORPHOUS SOLID DISPERSIONS: PHYSICAL AND CHEMICAL ASPECTS

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Drug amorphization is one of the major approaches in pharmaceutical sciences to improve the solubility and dissolution rate of poorly water-soluble drugs. Amorphous solid dispersions are widely discussed approach to convert the drug into an amorphous state but due to its high energy state, the system tends to recrystallize upon storage. Co-amorphous system is a single-phase low energy system that falls under the glass solution, a type of solid dispersion. Being low-energy state and single-phase, co-amorphous dispersions are more stable than amorphous solid dispersions. In co-amorphous dispersions, the homogeneous single phase is formed only with low molecular weight co-formers, so the amount of co-former required is relatively low and this reduces the bulk of the system. This aspect of co-amorphous dispersions makes it popular over the amorphous solid dispersions in the area of solid dispersion researchers. This review provides an overview of co-amorphous dispersions and their recent advances. Particularly, this review will discuss various factors (physical and chemical) that affect and provide the stability of the co-amorphous dispersions formulation.

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INTRODUCTION

Recently, drug in the amorphous state than crystalline has been extensively studied by researchers and has found promising applicability in the drug delivery field as it results in high bioavailability of drugs. Normally, drugs are in a crystalline state in solid dosage forms which ensures the best stability of the formulations. On the contrary, the most stable crystalline form depicts the poorest solubility behavior [1]. Whereas thermodynamics of solubility reveals that the amorphous form of solids exhibits higher apparent solubility and dissolution rate than that of the crystalline form [2]. Unfortunately, the same solubility thermodynamics also shows that amorphous substances are less stable than crystalline solids. Moreover, the reversion of amorphous to the crystalline state during processing, storage, and administration poses a major challenge for researchers [3, 4].

For several decades, amorphous solid dispersion (ASD) has been the approach of choice for stabilizing the amorphous form of a drug [5-7]. In ASD, the molecules are kinetically entrapped between the polymer chains in a high-

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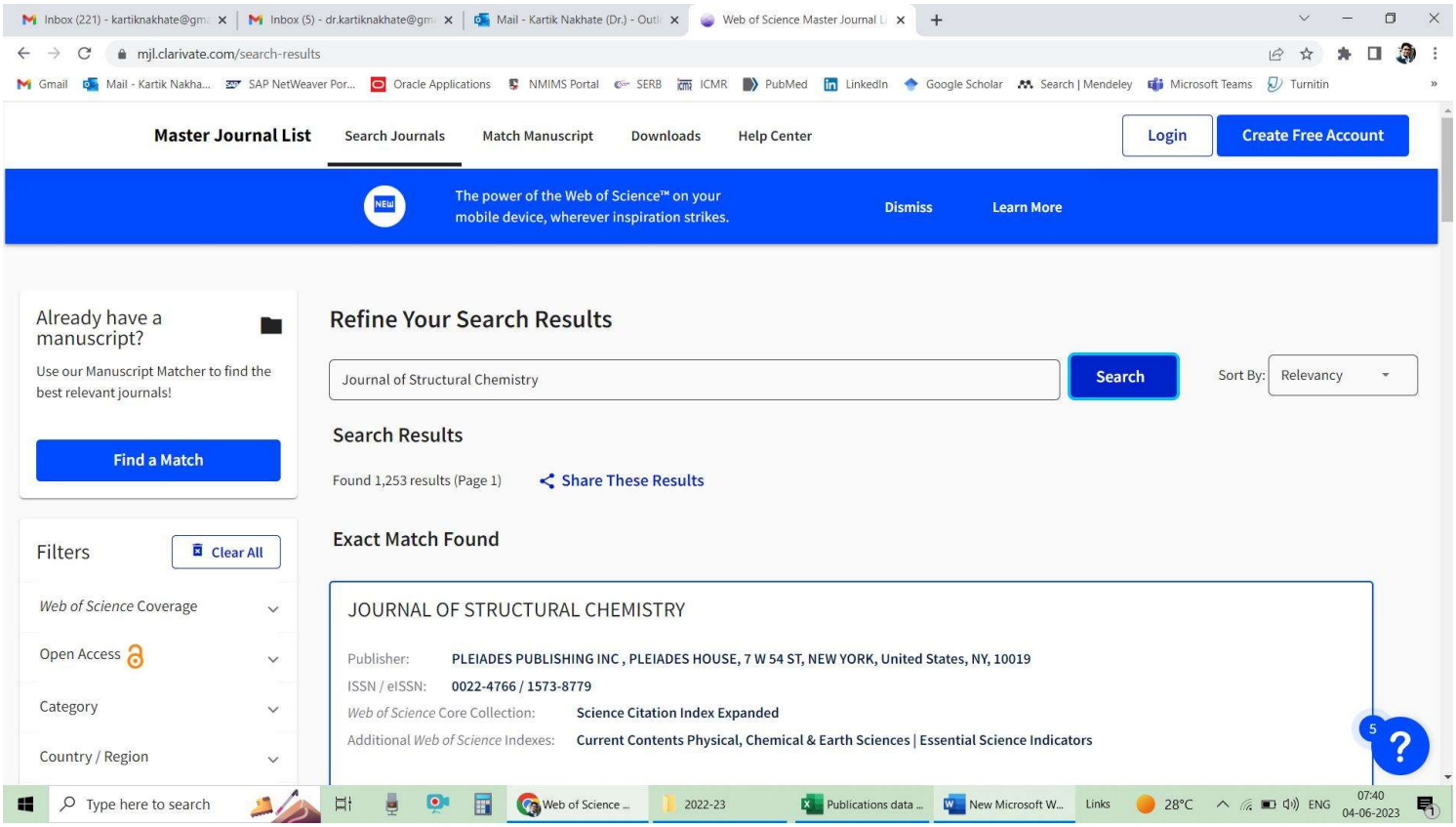
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