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Evaluation of three chitin metal silicate co-precipitates as a potential multifunctional single excipient in tablet formulations

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The performance of the novel chitin metal silicate (CMS) co-precipitates as a single multifunctional excipient in tablet formulation using direct compression and wet granulation methods is evaluated. The neutral, acidic, and basic drugs Spironolactone (SPL), ibuprofen (IBU) and metronidazole (MET), respectively, were used as model drugs. Commercial Aldactone®, Fleximex® and Dumazole® tablets containing SPL, IBU and MET, respectively, and tablets made using Avicel® 200, were used in the study for comparison purposes. Tablets of acceptable crushing strength (>40 N) were obtained using CMS. The friability values for all tablets were well below the maximum 1% USP tolerance limit. CMS produced superdisintegrating tablets (disintegration time < 1 min) with the three model drugs. Regarding the dissolution rate, the sequence was as follow: CMS > Fleximex® > Avicel® 200, CMS > Avicel® 200 > Dumazole® and Aldactone® > Avicel® 200 > CMS for IBU, MET and SPL, respectively. Compressional properties of formulations were analyzed using density measurements and the compression Kawakita equation as assessment parameters. On the basis of DSC results, CMS co precipitates were found to be compatible with the tested drugs. Conclusively, the CMS co-precipitates have the potential to be used as filler, binder, and superdisintegrant, all-in-one, in the design of tablets by the direct compression as well as wet granulation methods.

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