

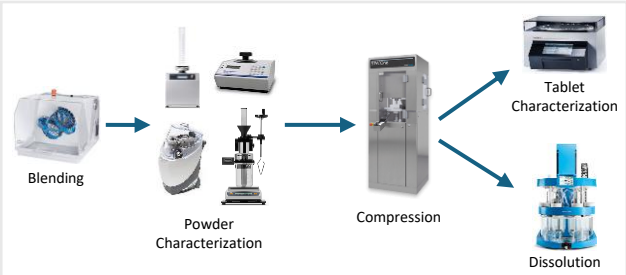
Introduction

Controlled release formulations are becoming more popular in the market due to their ability to release drug into the system at a determined rate to achieve most effective therapeutic ranges over time. Managing the drug release profile allows formulators to set the dosing to provide a steady and predictable treatment over longer times than immediate release formulations. With these benefits, patients can reduce the number of maintenance dosages per day without losing therapeutic effects. Having controlled release excipients that are direct compressible allows for oral dosage tablets to be easily made without the time needed to process the material before compression.

Methods

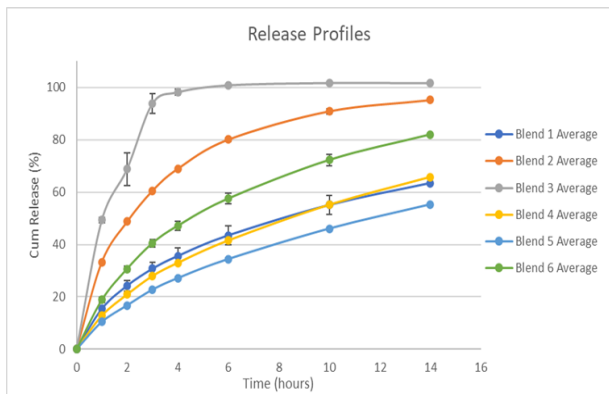
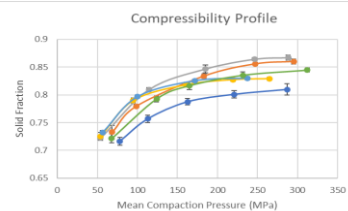
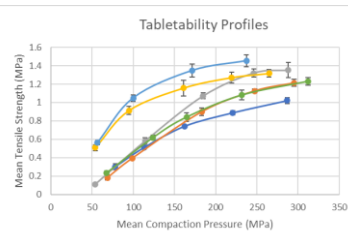
Table 1 outlines the 6 formulations and their corresponding compositions. Blending was done in a Turbula® mixer (WAB T2F). Powder characteristics for each blend were measured: bulk and tap density (Sotax TD1), true density (Micromeritics AccuPyc II 1345), flowability of 100 g through 10 mm orifice (Sotax PF1), and particle size distribution (Malvern Mastersizer 3000). Direct compression was performed with a STYL'One Evo compaction simulator (Korsch) using Euro B 10 mm standard concave tooling with a curvature radius of 10 (Natoli Engineering) and simulating a Korsch XL 400 tablet press with a target tablet weight of 400 mg. Ten tablets were characterized in a Sotax ST50. Dissolution of 6 tablets for each formulation were tested in a 2-stage 14-hour dissolution.

Blend #	% Propranolol HCl	% Pearlitol® CR-H	% Pearlitol® 200 GT	% HPMC K100	% HPMC K100M	% Magnesium stearate
1	10	89	0	0	0	1
2	10	44.5	44.5	0	0	1
3	10	29.675	59.325	0	0	1
4	10	44.5	0	44.5	0	1
5	10	44.5	0	0	44.5	1
6	10	66.75	22.25	0	0	1



Results

Blend #	Bulk Density (g/cm³)	Tap Density (g/cm³)	True Density (g/cm³)	Flowability (seconds)	Particle Size (µm) d10/d50/d90	Hausner Ratio
1	0.341	0.428	1.3572	28.1	44.9/131/271	1.26
2	0.480	0.573	1.3875	19.8	45.5/133/267	1.19
3	0.524	0.616	1.3999	18.0	44.8/128/243	1.18
4	0.363	0.510	1.3498	31.8*	31.2/107/251	1.40
5	0.361	0.522	1.3451	33.4	26.0/86.4/219	1.45
6	0.402	0.475	1.3686	24.6	44.5/140/309	1.18



Conclusion

Different release profiles can be achieved through the manipulation of the ratios of excipients used in tablet formulation. Pearlitol® CR-H co-processed mannitol-HPMC shows a capability of direct compression for controlled release applications which can reduce the time and processing of materials.

Learn more by scanning the QR code to be directed to Innovation Hub, the Pharma virtual lab by Roquette.

