

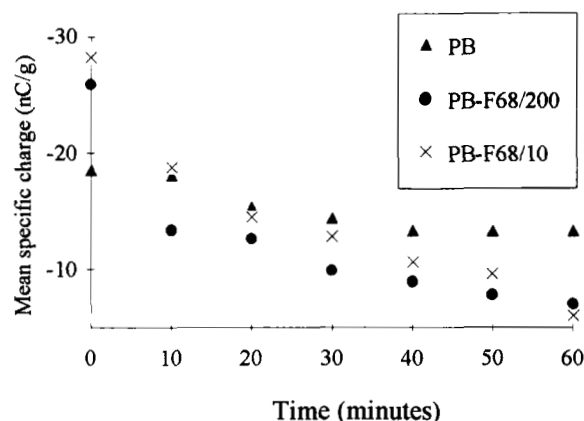
## Charge dissipation of polymer treated phenylbutazone

O. CASSIDY, V. STYLIANOPOULOS AND G. ROWLEY

*School of Health Sciences, University of Sunderland, Sunderland SR1 3SD*

Electrostatic charge accumulation and retention pose problems in powder handling, processing and storage and therefore methods to control or reduce the charge are much needed. The electrostatic charge of phenylbutazone (PB) can be significantly reduced by modifying the surface of drug particles with a hydrophilic polymer (Cassidy et al, 1996, Cassidy and Rowley, 1997a). Previous work has shown that this charge reduction phenomenon is dependent on the type, concentration, hydrophilic nature (Cassidy and Rowley, 1997b) and molecular weight of the polymer employed (Cassidy and Rowley, 1997c). An investigation of the effect of the adsorption of triblock copolymers, poloxamers (PLX), onto PB on electrostatic charge dissipation has been undertaken. The PLX employed were Synperonics (ICI) L62, L64 and F68 of which F68 has the best charge reduction capacity (Cassidy and Rowley, 1997b). Micronized PB was equilibrated in aqueous solutions of PLX of known concentration (10-200mg l<sup>-1</sup>), separated from solution and allowed to dry to constant weight. Cylindrical compacts (approximately 25mg) of untreated and surface modified PB were prepared on a single punch tablet machine (Manesty Type F3) in an unlubricated die. After compression, the charge of individual compacts was measured in a Faraday well connected to an electrometer (Keithley 610C). The compacts were subsequently stored over silica gel for up to four days to allow dissipation of charge generated by compaction prior to charging studies, after which a baseline charge value was established. The compacts were charged with a corona charging needle located 100µm above the sample surface with -1.1kV for 3 mins. The charge of 6 compacts of untreated PB and of each concentration of modified PB was measured immediately after charging and every 10 minutes up to 1 hr and at 24 and 48 hrs thereafter. The mean specific charge (Q/M) of untreated PB and two concentrations (10mg l<sup>-1</sup>, 200mg l<sup>-1</sup>) of F68 modified PB against time is illustrated in Figure 1.

Figure 1: Specific charge vs time for untreated and treated PB



Untreated PB gained an electronegative charge of -18.5nC g<sup>-1</sup> after corona charging, only slightly greater than the baseline value (-15.6nC g<sup>-1</sup>). Charge was retained over a long period with a value of -11.8nC g<sup>-1</sup> after 48hrs. F68 treated PB compacts gained a higher charge than untreated PB ie -25.9 and -28.6nC g<sup>-1</sup> for 200 and 10mg l<sup>-1</sup> respectively. The charge was significantly greater than baseline values for treated material, however the electrostatic discharge from treated compacts was rapid with charges reaching baseline values within 1hr for both concentrations of treated material. There did not appear to be a significant effect of poloxamer treatment concentration on charge dissipation after 60 mins, however after 10 mins the higher treatment concentration produced more effective charge decay. The work indicates that poloxamer treated PB charges and discharges more easily than untreated drug.

### References

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