Ion mobility spectrometry (IMS) may be used to determine the interaction cross-sections between an ion and a neutral gas, thereby providing ionic structural information for comparison with, or validation of, alternative values. The separation afforded by ion mobility (IM) broadly correlates with both mass and charge, a characteristic which has previously been exploited to enhance the transmission of a Quadrupole - IMS - QICRF and to reduce undesirable chemical noise. Here we report a new method exploiting these correlations where the potential difference between the IMS cell and a downstream fragmentation cell is varied over the IMS time so that the collision energy (CE) is optimised for ions exiting the IMS at a given time.

METHODS

A Synapt HDMS (Waters Corporation) was used in these studies, figure 1. In operation alternate scans of Low CE (non-fragmenting) and elevated CE (fragmenting) were acquired. When enabled, IMS was performed in three T-Wave devices; Trap, IMS and Transfer. The system pressures during each IMS T-Wave were ~ 10⁻⁶ mbar of Ar in the Trap and Transfer regions and 0.5 mbar of N₂ in the IMS T-Wave. The pressure during T-Wave only operation was ~ 8.10⁻⁷ mbar of Ar in the Trap and Transfer T-Wave regions. In this mode of operation the Trap CE potential was ramped between 12 and 35 eV during the Elevated CE scan.

RESULTS

In order to set up the Transfer CE look-up table a standard peptide mix solution (MassPrep - Waters Corp) containing equimolar mixtures of nine peptides (RASG-1, Angiotensin frag. 1-7, Bovine Serum Albumin, Yeast Enolase, Yeast Alcohol Dehydrogenase and Rabbit Phos. B) was infused at a rate of 1μl/min through the reference sprayer. This was chosen specifically to be different from the sample used in the fragmentation efficiency (FE) experiment to investigate the general applicability of this method. The optimum CE required to fragment a range of m/z and charge states was noted along with their peak arrival times. The optimum CE being defined as the energy required to fragment 90 to 95 % of the selected ion as shown in figure 2 along with the ramp chosen.

CONCLUSION

• Application of an Ion Mobility Linked Transfer T-Wave CE improved the Fragmentation Efficiency of a wide range of precursor ion masses in a nano- scale LC-MS/MS experiment by an average of 1.8 without detrimental side effects.

• The overall fragmentation quality in pseudo parallel MS3 type experiments was improved.

REFERENCES