E1-17: Resolution vs ion yield study on the first ^{252}Cf-Plasma Desorption Mass Spectrometer in Sri Lanka

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Plasma Desorption Mass Spectrometry (PDMS) which was introduced in 1974, has been growing rapidly during the recent past, due to its relative simplicity and suitability for heavy organic molecules over the other conventional methods. In this study, the plasma desorption (time-of-flight) mass spectrometer at the Dept. of Physics, was used to investigate the effect of flight- path and the secondary ion energies on the mass resolution and the secondary ion yield of the spectrometer. Flight paths at 5 different steps (0.10 m, 0.23 m, 0.40 m, 0.65 m and 0.95 m) and 7 different secondary ion energies (2 KeV, 4 KeV, 6 KeV, 8 Kev, 10 KeV, 12KeV and 14 KeV) were used in the study. The sample under investigation was CsBr.

The results reveal that the resolution of Cs^+ and its cluster ions increases almost linearly with the increase of flight length, but the transmission of some secondary ions (ie. yield) drops faster than what is expected from solid angle calculations.

The fast drop of transmission could partly be attributed to the increased number of collisions with the residual gas when the flight path is increased. The above variations are consistent for all secondary ion energies beyond 6 KeV but deviate from the common trend very slowly at the energies below 6 KeV. This could be due to the secondary ions having lower velocities than the threshold velocity needed for the detection by the channel electron multiplier detectors.

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