Chapter 6

GAS PHASE CLUSTERS
**Fig. 6.1:** Schematic representation of cluster placed in between atom, molecule and bulk material. From left to right the dimension of the constituent matter increases. Clusters can be produced from atomic or molecular constituents or from the bulk material. The variously colored balls are all different kinds of atoms. In relation to the dimensions of atoms and the cluster shown, the material should be a thousand times larger than the one depicted.
Fig. 6.3: Schematic of (a) Wien filter and (b) quadrupole mass analyzer. Ions of one kind only pass through for a given condition.
Fig. 6.4: (a) Linear TOF mass analyzer and (b) PSD mode analysis of fragments formed in the reflectron region of TOF. Masses of the ions analyzed and their trajectories are shown.
Fig. 6.5: A schematic of FT-ICR-MS showing the ion trapping, detection and signal generation
Fig. 6.8: (1) LDI mass spectrum of MoS$_2$ in the negative mode showing magic closed cage clusters. Inset: Experimental spectrum (a) shows the expected isotope distribution for Mo$_{13}$S$_{25}^-$ (b). (2) Atomic structure of the Mo$_{13}$S$_{25}$ cluster. A cloud in the center clearly showing the void space enclosed inside the cage-like structure of the Mo$_{13}$S$_{25}$ cluster. From the author’s work, published in (D. M. D. J. Singh, T. Pradeep, J. Bhattacharjee, U. V. Waghmare, *J. Phys. Chem. A.*, 2005, 109, 7339). Copyright (2005) American Chemical Society.
Fig. 6.9: Optimized tetrahedral structure of the Ti$_8$C$_{12}$ metcar. Titanium atoms are shown as dark and carbon atoms as light spheres. From Joswig, et al. (J. O. Joswig, M. Springborg and G. Seifert, Phys. Chem. Chem. Phys., 2001, 3, 5130). Reproduced with permission from the Royal Society of Chemistry.
Fig. 6.11. Mass spectra of (1) CsCl (2) CsI in (a) positive and (b) negative ion modes. Reprinted with permission from Y. J. Twu, C. W. S. Conover, Y. A. Yang, L. A. Bloomfield. (1990) Phys. Rev. B., 42, 5306. Copyright (1990) by the American Physical Society.