Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Long range anions:diatomic, triatomic and polyatomic molecules[1]

EDWARD C. CHEN, The Wentworth Foundation, EDWARD S. CHEN, Baylor College of Medicine — The observation of both long range and valence anions of O_2, NO, CS_2, N_2O, O_3, SF_6 , C_6F_6 CH_3NO_2, tetracene, anthracene, acridine, perylene, pyrene, naphthalene and the nucleobases is reported in negative ion mass spectrometry, photoionization, electron impact in nanodroplets, electron swarm experiments at low temperature and alkali metal beam studies.. New polarization or quadrupole bound electron affinities less than 0.1 eV are reported for the aromatic hydrocarbons, O_2, SF_6, CS_2 , C_6F_6 while dipole bound values less than 0.15 eV are reported for the nucleobases, N_2O and NO. The long range states act as gateways to valence states. This relationship is illustrated by Morse potential energy curves in single bond dissociations and in reaction coordinates analogous to Marcus parabolas. New adiabatic electron affinities are reported for some of these molecules, including (in eV) guanine, 1.64(2) adenine, 1.09(2); C_6F_6, 1.26(5); acridine, 1.09(2); perylene ,1.09(2); tetracene, 1.10(2), naphthalene, 0.19(2) eV.

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Date submitted: 14 Dec 2007 Electronic form version 1.4