II. Mid-Career

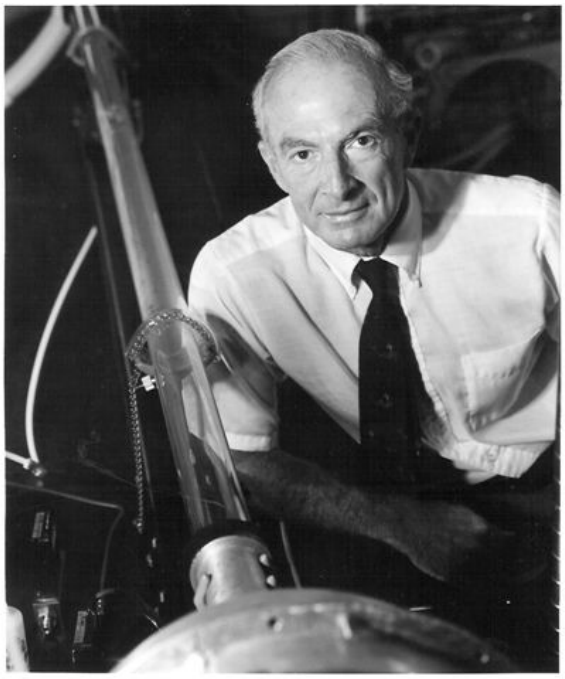
After moving to Caltech in 1964, Friedlander continued research on asymptotic size distributions and began studies of the Los Angeles smog aerosol. He pointed out that basic chemical thermodynamics shows that in the atmosphere ammonium nitrate must be distributed between the gas and aerosol phases. Noting the unreliability of aerosol emission inventories, he published a series of papers on receptor modeling using chemical element balances for source resolution, a novel extension of undergraduate stoichiometry. Friedlander was one of the organizers of ACHEX, the first large scale study of the atmospheric aerosol. He also published the first edition of Smoke, Dust and Haze, conducted research on aerosol beams and used them to shoot particles into the mass spectrometer for single particle chemical analysis in collaborative studies with JPL

III Mature Years

In 1978, Friedlander moved to UCLA where he helped set up and later chair the Department of Chemical Engineering. He extended source resolution concepts to the carbon containing component of the atmospheric aerosol. In 1982, he helped found the American Association for Aerosol Research which had its first meeting in Santa Monica. He coined the phrase "aerosol reaction engineering" to describe the synthesis of fine particles as a desirable product by aerosol processes. With W. Koch, he modified Smoluchowski's coagulation theory to incorporate coalescence rates, providing a basic design equation for aerosol reaction engineering. In 1997, he initiated studies of the dynamic behavior of nanoparticle chain aggregates in the electron microscope and found evidence of elastic recoil when aggregates broke under tension. Most recently his group has used atomic force microscopy to measure the forces that hold aggregates together. The second edition of Smoke, Dust and Haze appeared in 2000.

Scientifically active till his death, Friedlander campaigned for the recognition of aerosol science and technology (AST) as an enabling discipline with its own fundamental equations and experimental and computational methods. Advances in many applied fields depend on AST -- air pollution and the atmospheric sciences, occupational health and industrial hygiene, commercial synthesis of fine particles for catalysts and pigments, nanocomposite materials (e.g., rubber), nanostructured coatings and sensor surfaces, nuclear reactor safety and microcontamination control. Medical applications include inhalation and gene therapy. Although scientists faced with aerosol problems in the past have often come from other fields, we are reaching the point where young people educated in AST will be chosen for their special knowledge. The Friedlander Award given out by the American Association for Aerosol Research recognizes and encourages such individuals.

Prof Friedlander in his early years



Prof Friedlander in his Laboratory

At a reception in India (IIT Bombay) attending the NAST Workshop funded by the Indo-US Forum and the 4th Asian Aerosol Conference in Mumbai, December 2005.

At the 7th International Aerosol Conference in St. Paul, MN in September 2006 with some of the founding members of AAAR and Past Presidents. His pioneering talk on the next 25 years of Aerosol Science and Technology as an Enabling Discipline probably was his last major presentation in a large public forum.