

Mars Phoenix Lander Thermal and Evolved Gas Analyzer

John H. Hoffman

Physics Department, University of Texas at Dallas

The Phoenix mission to Mars consisted of a spacecraft that landed in the far northern region of the planet on May 25, 2008 with the goals, among others, of verifying the presence of water on Mars and determining the mineralogy of the surface materials. It incorporated a robotic arm capable of digging trenches in the surface and depositing samples in two of the onboard instruments, the Wet Chemistry Laboratory and the Thermal Evolved Gas Analyzer (TEGA). The latter consisted of a set of 8 very small ovens that heated samples up to 1000° C and a mass spectrometer, the Evolved Gas Analyzer (EGA), to analyze gases evolved during the heating process. The EGA consisted of a magnetic sector-field mass analyzer having a mass range of 1 to 140 Da, an electron bombardment ion source, a gas handling manifold, associated electronics and a vacuum maintenance pump. At a depth of about 5 cm below the surface a very hard material was exposed. Analysis of the material confirmed the presence of water ice mixed with the soil. In addition, magnesium perchlorate was found in the soil at an abundance of nearly 1%, which was totally unexpected. However, no hydrocarbons were found. Details of these results will be presented.