

December 7, 2017 Analytical Cumulative Examination

Professor Michael Trenary

Spacecraft that have been sent to explore the planets of our solar system contain some of the most advanced analytical instruments ever developed. Several spacecraft have landed on the planet Mars, with the first being the Viking landers, which arrived on Mars in 1976. This CUME will cover the basic features of four key instrument modules on the Mars Science Laboratory currently exploring the surface of Mars on the Curiosity rover: 1) the sample analysis at Mars (SAM) module; 2) the alpha particle x-ray spectrometer (APXS); 3) the ChemCam instrument; and 4) the chemical and mineralogy analysis instruments (CheMin). Please provide a brief description (no more than one page, if you write more than one page, only the first page will be graded) of each module. In your description, please indicate the basic principles of the measurement methods, the type of information provided by the different methods, the instruments contained within each module, whether the measurements are made while samples are outside the rover, or whether samples are brought inside the rover for analysis. If appropriate, indicate if the method is designed to measure such things as isotopic composition of gases in the Martian atmosphere, elemental composition of rocks, crystal structure of different minerals, organic compounds contained within Martian rocks, etc.