

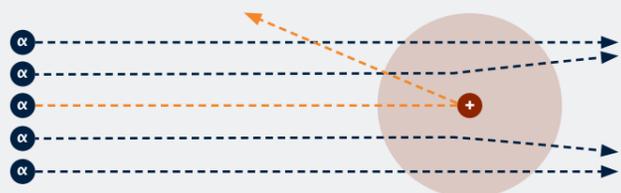
THE PHILAE LANDER – CHEMISTRY ON A COMET

The Rosetta mission aims to gather information on comet 67P, and a lot of the science the Philae lander is carrying out as part of its mission there is chemistry. This graphic looks at some of the analytical instruments fitted to the lander, and the chemistry that they'll hopefully be able to tell us about.

APXS

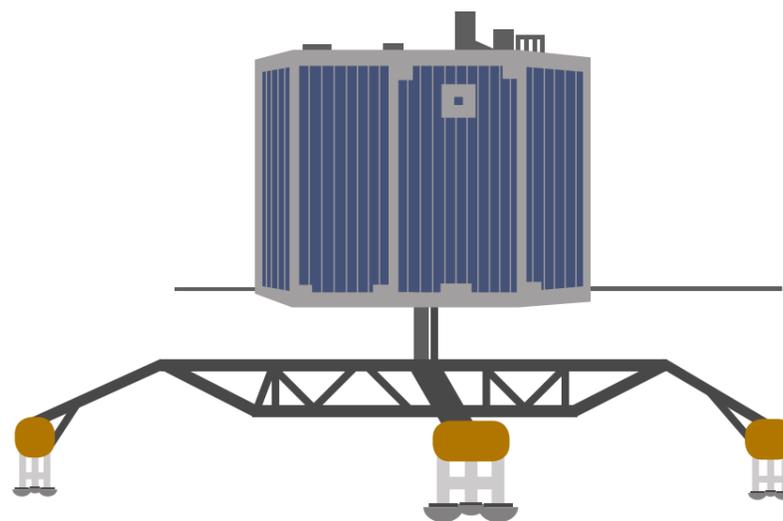
Alpha Particle X-ray Spectrometer

Bombards the surface of the comet with alpha particles and X-rays; some of the alpha particles scatter back towards the source, and can then be detected. They can also boot electrons from shells, and as an outer shell electron takes their place, an X-ray is emitted. Analysing the results allows determination of the elemental composition of the surface.



Some alpha particles 'backscatter' if they collide with an atom's nucleus

PHILAE FACTS



1

Philae is the first spacecraft in history to successfully land on a moving comet.

57

Hours that Philae collected data before going silent after its initial landing.

7

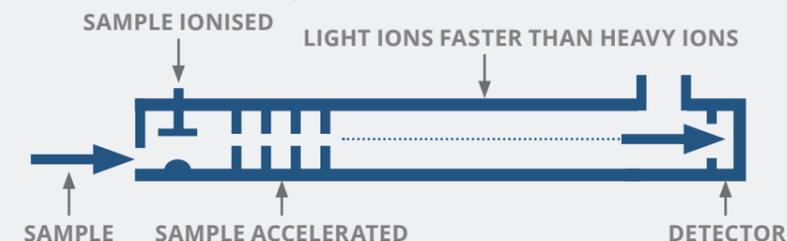
Months between Philae going silent and waking up in June 2015.

10

Number of different scientific instruments Philae is equipped with.

PTOLEMY

Isotope ratio measurement

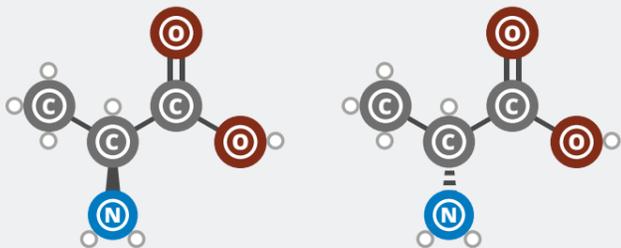


How Ptolemy's mass spectrometer works

The Ptolemy instrument operates in a similar manner to the COSAC instrument, and contains similar equipment. Its primary purpose is to determine the ratio of isotopes of light elements such as carbon and oxygen. This will tell us more about the comet's origin if they vary from the usual isotopic ratios found in our solar system.

COSAC

Cometary Sampling & Composition instrument

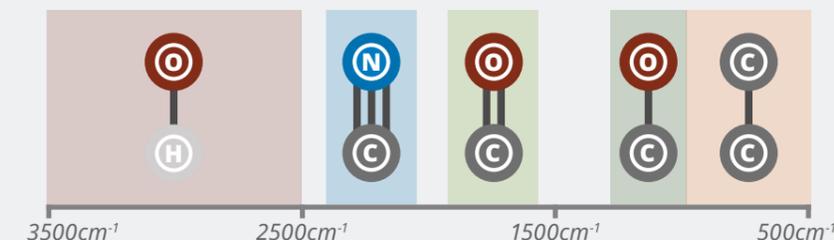


The amino acids L-alanine (dominant form on Earth) and D-alanine

Heats soil samples and passes the gases given off through a gas chromatograph and mass spectrometer, giving us information about the compounds' chemical identities. It may detect amino acids or their building blocks, the chirality of which may provide clues as to whether life on Earth was 'seeded' by comets.

CIVA

Comet nucleus Infrared & Visible Analyser



Infrared absorption ranges for selected bond types

Part of this instrument consists of a set of cameras. It also includes two miniaturised microscopes, one using visible light and one using infrared, designed to observe the texture, reflectance, and composition of surface material. Chemical bonds in the sample absorb infrared light, giving information on the compounds therein.

