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Martian dust may be hazardous to your health

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19:16 09 March 2007
NewScientist.com news service
Jeff Hecht

Dust on Mars may be more than a nuisance to future astronauts. Laboratory experiments suggest the dust particles may have surfaces more highly reactive – and thus more dangerous – than quartz grains that are blamed for lung disease among terrestrial miners.

NASA has long recognised that dust might pose health issues. Fine, abrasive dust stuck to the spacesuits of Apollo astronauts, and Apollo 17 astronaut Harrison Schmitt complained of "lunar dust hay fever" (see *The gritty problem of Moon dust*).

A 2002 National Research Council study group warned that airborne dust could pose a threat on Mars, and urged NASA to study the dust and find ways to mitigate its threats. But so far most research has been on quartz dust, which is common on Earth but is not expected on the Moon or Mars.

To study the properties of Martian dust, a team at Stony Brook University in New York, US, ground up the three most common silicate minerals found on the Red Planet – feldspar, pyroxene, and olivine.

Highly reactive

When they mixed 5 milliliters of water with a couple hundred milligrams of dust from the basaltic minerals, they found that freshly broken chemical bonds on the dust surface reacted with the water to produce hydrogen peroxide, as well as highly reactive hydroxyl (OH) molecules and oxygen molecules with an extra electron, called superoxide.

The same hazardous and highly reactive compounds come from the reaction of fresh quartz dust with water. Inflammation and scarring of the lungs by the inhalation of quartz dust is blamed for the lung disease silicosis, which affects many miners.

The experiments showed "basaltic minerals are more reactive than quartz, which is a known carcinogen", lead author Joel Hurowitz, now at NASA's Jet Propulsion Laboratory in Pasadena, California, US, told **New Scientist**.

Lunar dust may be even worse. Hurowitz heated a sample of pulverised rock to drive out residual moisture and simulate the dryness caused by exposure to lunar vacuum. When he mixed the simulated lunar dust with water, "the amount of peroxide was about 20 times higher than when we just took the feldspar and ground it up" to simulate Martian dust, he says.

Toxic rain

Mars is not wet enough now to produce peroxide by reactions of moisture with surface dust, says Sushil Atreya of the University of Michigan in Ann Arbor. His own studies show that peroxides and other oxidants – which might explain the puzzling paucity of organic compounds on Mars – are produced by electrostatic fields generated in Martian dust devils and sandstorms (see *Is toxic rain killing organic molecules on Mars?*).

Still, inhaling the dust particles would bring them into contact with moisture in the astronauts' lungs, which may potentially cause health problems.

In any case, Atreya told **New Scientist**: "It is important that we understand fully the phenomena of Martian dust, associated electric fields, resulting chemistry, and their physiological implications, before embarking on human exploration of Mars."

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