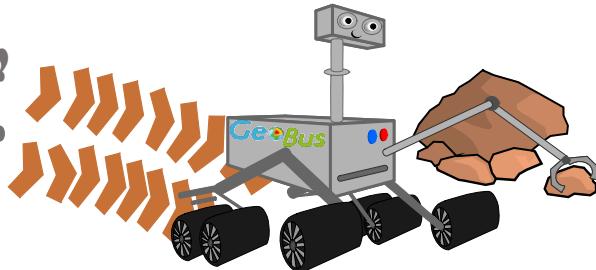


Science Fact or Fiction? Extracting Water Instructions



Materials Needed:

Microwave
Microwaveable tupperware/container
Clingfilm
Soil samples (collected from local area)
Measuring jug (to measure water - optional)

Instructions:

1. Place some soil in a microwavable container
2. Cover the container tightly with cling film, so that no air can escape
3. Microwave on medium power in 20-30s bursts (for ~1 min)
4. Remove the container from the microwave and look closely at the cling film – is there any condensation?
5. If you wish, carefully remove the cling film and see how much water you can collect in a measuring jug
6. Repeat with different soil samples to see if there is any difference in the amount of water contained in the samples

How it works:

Microwaves are efficient at freeing bound water molecules from the soil, because they (the microwaves) are easily absorbed by the water molecules, heating them up and turning them to water vapour. The vaporised water then rises and condenses when it hits the colder cling film.

The microwaves essentially bake the water content out of the soil.

Other sources of water on Mars:

Atmospheric Water Vapour – 100% relative humidity has been observed on Mars but the atmosphere is very thin so the amount of available water is very small.

Ground Water – there is potentially liquid water in subsurface deposits (e.g. aquifers) on Mars (it's possibly these exist as salty solutions, see 'Salty Soil' activity).

Ice / Polar ice caps

Subsurface layers – "cryosphere" (e.g., permafrost)

Human missions to Mars will require a water source for consumption, as well as activities such as farming or manufacturing. Due to the absence of free water on the Martian surface, researchers are working to develop a unit capable of extracting water from the soil. The design has to be able to operate autonomously (with no on-site maintenance) and be able to withstand acceleration forces of up to 5G to survive the journey!