

P7- Experiment Procedure “Water Detection”

GENERAL INFORMATION

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SHORT EXPERIMENT DESCRIPTION

Water is an important indicator of life and a topic of heavy research in modern Astrophysics, Astrobiology as well as space exploration in general. Students search for signs of water, collecting rock samples that they then crumble with hammer and chisel, before heating the rock and comparing its weight before and after heating to measure a possible weight difference from evaporated water

*Experiment can be conducted with OR without suit being on


HARDWARE CHECKLIST

	Rock samples (x2 or x3)
	Hammer
	Chisel
	Moisture meter
	Oven-safe dishes (x3)
	Shovel
	Spade
	Kitchen scales (for weighing samples)
	Gloves (x how many?)
	Goggles (x how many?)
	Sample bags (4 or 6)
	Waterproof marker
	Cell phone

PROCEDURE

PROCEDURE “WATER DETECTION”

WATER DETECTION

Step	Action	NOTES	Duration	Check
1	Let students collect rock and soil samples using gloves, shovel and spade and place in individual sample bags Use waterproof marker to label sample bags with WD1-WD4 (or WD1-WD6) Use cell phone and accompanied spreadsheet to record GPS coordinates from each sample site	*Sample locations should be at least 100m apart *Students may decide to either do 2 samples rock/2 samples soil OR 3 samples rock/3 samples soil.	15 min.	
2	Use goggles, gloves, hammer and chisel outdoors to break rock into pieces small enough to fit on kitchen scale		3 min.	
3	Weigh crumbled rock samples	Document weight using accompanied spreadsheet	30 sec.	
4	Place tip of moisture meter into soil samples for 10 seconds	Document moisture using accompanied spreadsheet 	30 sec.	
5	Let rocks air dry at room temperature for one day	Record conditions surrounding drying location (i.e. direct sunlight, approx temp, etc.)	1 day	
6	Let soil samples air dry at room temperature for one day	Record conditions surrounding drying location (i.e. direct sunlight, approx temp, etc.) *Done at the same time as step 5	1 day	
7	Weigh the crumbled rock samples	Document weight using accompanied spreadsheet	30 sec.	
8	Place tip of moisture meter into soil samples for 10 seconds	Document moisture using accompanied spreadsheet	30 sec	
9	Put rock samples in oven-safe dishes and heat at around 110°C for 30 minutes	*Multiple samples may be present on same dish, but ensure separation to limit cross-contamination	30 min.	

PROCEDURE "WATER DETECTION"

10	Put soil samples in oven-safe dishes and heat at around 110°C for 30 minutes	*Multiple samples may be present on same dish, but ensure separation to limit cross-contamination *Done at the same time as step 9	30 min.	
11	Let rock and soil samples cool for 30 minutes	*Outside of oven, be mindful of hot surfaces	30 min.	
12	Weigh rock samples individually and compare the three weights (= weight (1) before air drying, (2) after air drying, (3) after putting into oven)	The weight difference equals the amount of evaporated water in each respective sample ⇒ i.e. weight (1) – weight (2), weight (2) – weight (3), weight (1) – weight (3)	5 min.	
13	Place tip of moisture meter into soil samples for 10 seconds	Document moisture using accompanied spreadsheet	5 min.	
14	Compare results and dispose of samples	*Samples may be disposed of outside, bags to be discarded according to local disposal guidelines	5 min.	

NOTE: See Data Table -> P7_Water Detection_Data Table