

SIMULATED LUNAR HIGH LAND ROCKS USING JAPANESE IGNEOUS ROCKS

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Lunar highland rocks are composed of
1) ferroan anorthosites, 2) Mg-rich rocks,
and 3) KREEP basalts.

The mixing ratios change according to lunar place.

The best method to make simulated lunar high land rocks

is to prepare each simulated rock, 1) ferroan anorthosite, 2) Mg-rich rocks, and 3) KREEP rocks separately and then to mix them with each ratio depending on each places.

Ferroan anorthosite is mainly composed of high Ca feldspar, anorthite content (An) is 96 to 98% because lunar contains low Na.

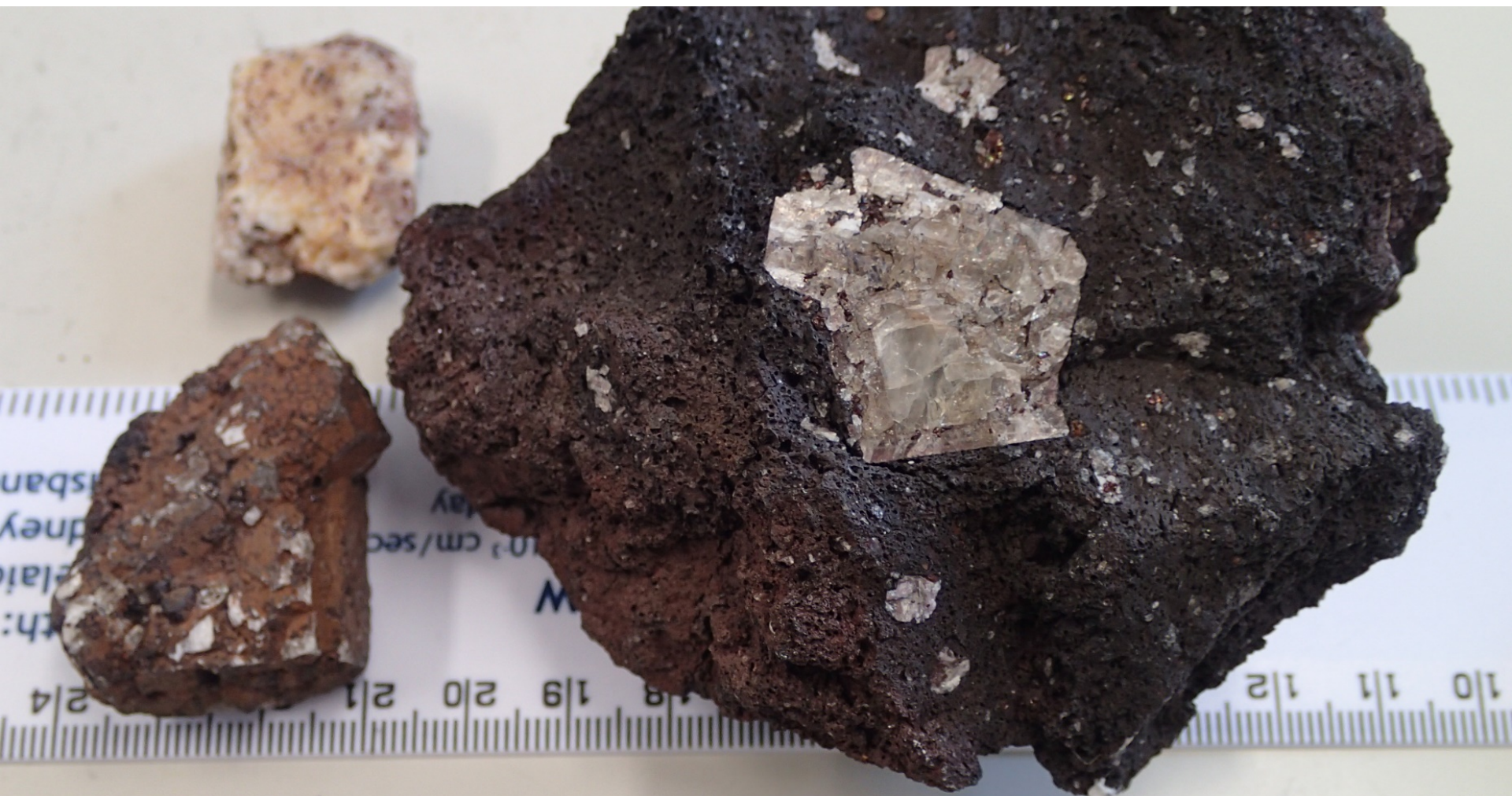
Earth contains high Na in rocks. Then, anorthosite mainly composed of feldspar in earth is not high An content (70% stillwater).

Then, we found high An content phenocryst easily separation.

Anorthite phenocryst in **Miyakejima volcanic bomb** ranged from 95 to 98%.

Anorthite phenocryst in **Fugoppe andesite** tuff ranged from 92 to 95%.

Both anorthite phenocryst is easily separated.



left : anorthite crystal, volcanic bomb
right: anorthite phenocryst in basalt
lava in Miyakejima



**anorthite in andesite tuff
in Fugoppe**

Chemical composition (%) of Ferroan anorthosite and anorthite phenocrst in Miyakejima and Fugoppe		Anorthite Phenocryst average values			Ferroan Anorthosite	
		Miyakejima		Fugoppe	Mini	Max
		lava, olivine	No lava			
	SiO ₂	41.25	43.66	43.41	41.90	48.00
	TiO ₂	0.03	n.d.	0.12	0.01	1.36
	Al ₂ O ₃	33.20	36.00	36.17	11.10	35.60
	Fe ₂ O ₃	2.83	0.70	0.56		
	FeO	0.72	0.43	n.d.	0.15	15.70
	MnO	0.04	n.d.	0.01	0.00	0.24
	MgO	3.59	0.17	0.09	0.14	10.10
	CaO	18.34	19.38	19.27	13.00	20.40
	Na ₂ O	0.48	0.46	0.50	0.18	0.57
	K ₂ O	0.01	0.04	0.03	0.01	0.11
	P ₂ O ₅	0.00	n.d.	0.00	0.01	0.05

Mg-rich rock is not well defined ranging from olivine-rich rocks (dunite) all the way to rocks composed of pyroxene and Na-rich plagioclase (gabbro). Preparation can be used popular rocks.

KREEP basalt is low Na and SiO_2 and high Mg relative to earth basalt, however volumetrically, KREEP basalts are far less important.

Then ordinal basalt can be used for KREEP basalt. Miyakejima basalt with An feldspar was used for KREEP basalt.

<Conclusion>

Anorthite phenocrysts in Miyakejima and Fugoppe were simulated as ferroan anorthosites.

Popular ultrabasic rocks (gabbro and dunite) were simulated as Mg-rich rocks.

Popular basalt in Miyakejima as well as anorthite phenocrysts was simulated as KREEP basalts.

The simulated lunar highland rocks can be made of a mixture of **anorthite phenocrysts in Miyakejima and Fugoppe**, popular ultrabasic rocks and popular basalts.