## SI Geology - Full Discipline Demo

## Igneous Rocks

### Final Report - Answer Guide

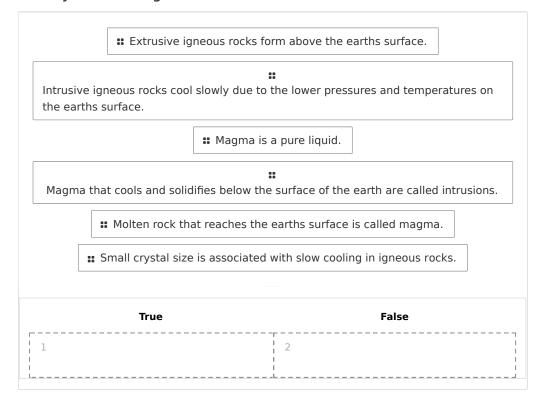
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### Test Your Knowledge



#### Classify the following statements as true or false.



#### Correct answers:

1 Extrusive igneous rocks form above the earths surface.

Intrusive igneous rocks cool slowly due to the lower pressures and temperatures on the earths surface.

Magma that cools and solidifies below the surface of the earth are called intrusions.

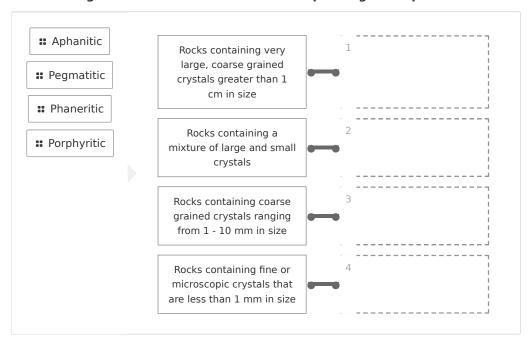
2 Magma is a pure liquid.

Molten rock that reaches the earths surface is called magma.

Small crystal size is associated with slow cooling in igneous rocks.



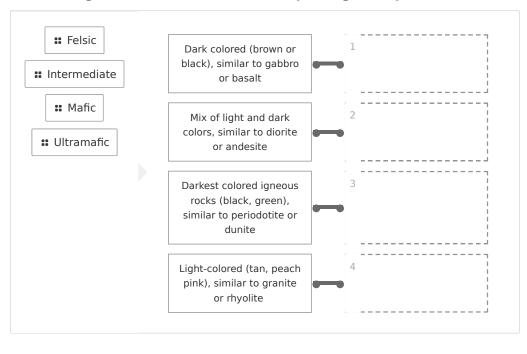
#### Match the igneous rock textures to its corresponding description.



#### Correct answers:

1 Pegmatitic 2 Porphyritic 3 Phaneritic 4 Aphanitic

#### Match the igneous color index to its corresponding description.



#### Correct answers:

1 Mafic 2 Intermediate 3 Ultramafic 4 Felsic

## **Exploration**

Lava that cools and solidifies above Earth's surface is called an intrusion.

○ True ○ False	•
Intrusive igneous rocks cool slowly, resulting in rocks with  large crystals small crystals no crystals	<b>~</b>

	Rocks with a(n) hand lens or micro	texture contain crystals that are visible only with a scope.	
	<ul><li>pegmatitic</li></ul>		
	oporphyritic		
	phaneritic		
	aphanitic		•
	The color of an ign composition.	neous rock is largely a product of its chemical	
	○ True		<b>✓</b>
	○ False		
	Which of the follow	wing is not a felsic mineral?	
	Quartz		
	Olivine		<b>~</b>
	Potassium feldsp	ar	
	<ul><li>Muscovite</li></ul>		
Exerc	ise 1		
What w	as the crystal size f	or room temperature environment (large or small)?	
Did the	room temperature	environment represent slow or fast cooling?	



	the igneous ro	ck texture fo	r the room t	emperature	crystals?	
hat was the o	rystal size for	the cold temp	erature env	rironment (la	arge or small	)?
d the cold te	mperature envi	ronment rep	esent slow	or fast cooli	ng?	
d the cold te	mperature envi	ronment rep	resent slow	or fast cooli	ng?	
d the cold te	nperature envi	ronment rep	esent slow	or fast cooli	ng?	
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d the cold te	mperature envi	ronment rep	resent slow	or fast cooli	ng?	
	mperature envi					

# Data Table 1: Salol Crystallization (SAMPLE ANSWER BELOW)

Environment	Observations	Description of Crystals
Petri Dish at Room Temperature	Crystallization started at one point near the middle of the dish after a couple minutes. Crystals grew outward from that point slowly over a period of ~10 minutes.	Large, radiating crystals. Some almost the whole length of the dish
Frozen Petri Dish	Crystals started forming immediately around the edges of the dish. Crystals grew rapidly over a period of ~2 minutes	Tiny, radiating crystals growing in clumps. Some too small to distinguish

Photo 1: Salol Crystals (SAMPLE ANSWER BELOW)



Data Table 2: Igneous Rock Crystals (SAMPLE ANSWER BELOW)



Sample	Crystal Size (large, small, mixed)	Rate of Cooling (slow, fast, mixed)	Other Observations
1	Large	Slow	Varies
2	Small	Very fast	Varies
3	Small	Fast	Varies
4	Mixed	Mixed	Varies
5	Large	Slow	Varies
6	Small	Fast	Varies
7	Large	Slow	Varies
8	Small	Very fast	Varies

### Exercise 2

Based on your observations, which igneous rock samples would have been formed by magma intrusions? Which would be formed by lava extrusions?

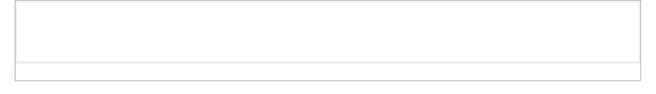


Photo 2: Igneous Rock Set (SAMPLE ANSWER BELOW)



# Data Table 3: Igneous Rock Identification (SAMPLE ANSWER BELOW)

Sample	Color	Mafic Color Index	Minerals Present	Texture	Rock Name
1	White, gray, pink, black spots	Felsic	Quartz, K-spar, biotite, muscovite	Phaneritic	Granite
2	Tan, light gray, white	Felsic	Quartz, K-spar, plagioclase	Vesicular	Pumice
3	Dark gray/black	Mafic	Plagioclase, amphibole	Aphanitic	Basalt
4		Intermediate	Quartz, plagioclase, amphibole	Porphyritic	Porphyritic Andesite
5	Black, green, brown, dark gray	Mafic	Plagioclase, pyroxene, olivine	Phaneritic	Gabbro
6	Light pink, tan	Felsic	Quartz, K-spar, biotite, muscovite	Aphanitic	Rhyolite
7	White and black	Intermediate	Plagioclase, amphibole, biotite, quartz	Phaneritic	Diorite
8	Black	can be categorized as felsic, intermediate, or mafic according to the flow chart	Variable (composed of amorphous silica)	Glassy	Obsidian

## Competency Review

Mafic minerals are rich in and	
iron; aluminum	
o tin; aluminum	
iron; magnesium	✓
magnesium; tin	
Extrusive igneous rocks cool, resulting in the formatic crystals.	on ot
o rapidly; large	
o rapidly; small	<b>~</b>
slowly; large	
	would be
An igneous rock with a mixture of large and small crystals classified as  porphyritic phaneritic aphanitic pegmatitic	would be ✓
An igneous rock with a mixture of large and small crystals classified as    porphyritic	
An igneous rock with a mixture of large and small crystals classified as    porphyritic	
An igneous rock with a mixture of large and small crystals classified as    porphyritic	
An igneous rock with a mixture of large and small crystals classified as    porphyritic	



When simulating igneous rock formation using salol, cooling at room temperature represents extrusive igneous rock formation.

<ul><li>True</li><li>False</li></ul>	<b>~</b>
The rocks in the image below are	
rhyolite	
o pumice	
gabbro	<b>~</b>
⊕ gabbio	
Phaneritic rocks contain coarse grained crystals ranging from 1 - 10 mr	n.
○ True	<b>~</b>
- False	

A mafic igneous rock sample that is phaneritic in texture and contains the minerals plagioclase, pyroxene, and olivine would be classified as \_\_\_\_\_.

obsidian			
gabbro			
diorite			
<ul><li>basalt</li></ul>			

### **Extension Questions**

Iceland is known for its unique geology, including rock columns, such as the ones found at Reynisfjara Beach. See figure below.

- Research the geology of Iceland, with a particular focus on the types of rocks present. Why are these rocks predominant?
- What type of rock creates the columns in the figure? How are these columns formed?



(SAMPLE ANSWER BELOW)

Iceland is located on the boundary of two tectonic plates, as well as on top of a hotspot. As a result, there is a high degree of volcanic activity in Iceland, resulting in a high amount of igneous rocks. In fact, the majority of rocks in Iceland are igneous rocks. The columns depicted are basalt columns. Basalt is an extrusive igneous rock. These rocks exhibit columnar jointing as a result of their rapid cooling, giving them a unique, hexagonal shape.