

SI Geology - Full Discipline Demo

Crystallization

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Geology - Full Discipline Demo
Course	SI Geology - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Classify the following statements as true or false.

True	False
1	2

⚡

Crystal formation through solid state diffusion occurs when atoms that are dissolved in water bond together and separate from the solution.

⚡

Crystal formation due to precipitation from a gas primarily occurs around volcanic vents and geysers.

⚡

Biom mineralization occurs when living organism cause minerals to precipitate within or adjacent to an organism's body.

⚡ Low pressure conditions during crystal formation will result in large crystals.

⚡ The size and quantity of crystals formed increases in slightly acidic environments.

Correct answers:

1

Crystal formation due to precipitation from a gas primarily occurs around volcanic vents and geysers.

Biom mineralization occurs when living organism cause minerals to precipitate within or adjacent to an organism's body.

The size and quantity of crystals formed increases in slightly acidic environments.

2

Crystal formation through solid state diffusion occurs when atoms that are dissolved in water bond together and separate from the solution.

Low pressure conditions during crystal formation will result in large crystals.

Exploration

Which of the following is not a method of crystal formation?

- ☐ Liquid-State Diffusion ✓
- ☐ Precipitation from a Solution
- ☐ Biomineralization
- ☐ Precipitation of a Gas

When a solution is cooled rapidly, crystals grow ____ a solution cooled slowly.

- ☐ slower than
- ☐ faster than ✓
- ☐ at the same rate as

Exercise 1

1. Why does the solution need to be saturated in order to grow crystals?

2. Identify the environmental factors that could affect crystal growth and describe how each of these factors influence crystal growth.

3. How did your theories about crystalization patterns under the different temperatures compare to your results? If you were unable to grow any of the crystals in any of the conditions, explain why this could have happened.

Data Table 1: Saturation of the Solutions
(SAMPLE ANSWER BELOW)

Chemical Compound	Weight of Cup (g)	Starting Weight (g)	Final Weight (g)	Amount Used for Saturation
MgSO ₄	3.2	50	7.1	42.9
Al ₂ (SO ₄) ₃	3.3	25	5.6	19.4
CuSO ₄	3.3	25	5.8	19.2

Data Table 2: Theorized Crystal Growth
(SAMPLE ANSWER BELOW)

Chemical Compound	Observations: Room Temperature	Observations: Refrigerated Crystals
MgSO ₄	Student answers will vary	Student answers will vary
Al ₂ (SO ₄) ₃	Student answers will vary	Student answers will vary
CuSO ₄	Student answers will vary	Student answers will vary

Data Table 3: Crystal Growth Observations
(SAMPLE ANSWER BELOW)

Chemical Compound	Observations: Room Temperature	Observations: Refrigerated Crystals
MgSO ₄	Observations will vary. Size should be larger than the refrigerated crystals.	Size should be smaller than the room temperature crystals.
Al ₂ (SO ₄) ₃	Size should be larger than the refrigerated crystals.	Size should be smaller than the room temperature crystals.
CuSO ₄	Size should be larger than the refrigerated crystals.	Size should be smaller than the room temperature crystals.

Photo 1: MgSO₄ Room Temperature
(SAMPLE ANSWER BELOW)





Photo 2: MgSO_4 Refrigerated
(SAMPLE ANSWER BELOW)





Photo 3: $\text{Al}_2(\text{SO}_4)_3$ Room Temperature
(SAMPLE ANSWER BELOW)





Photo 4: $\text{Al}_2(\text{SO}_4)_3$ Refrigerated
(SAMPLE ANSWER BELOW)

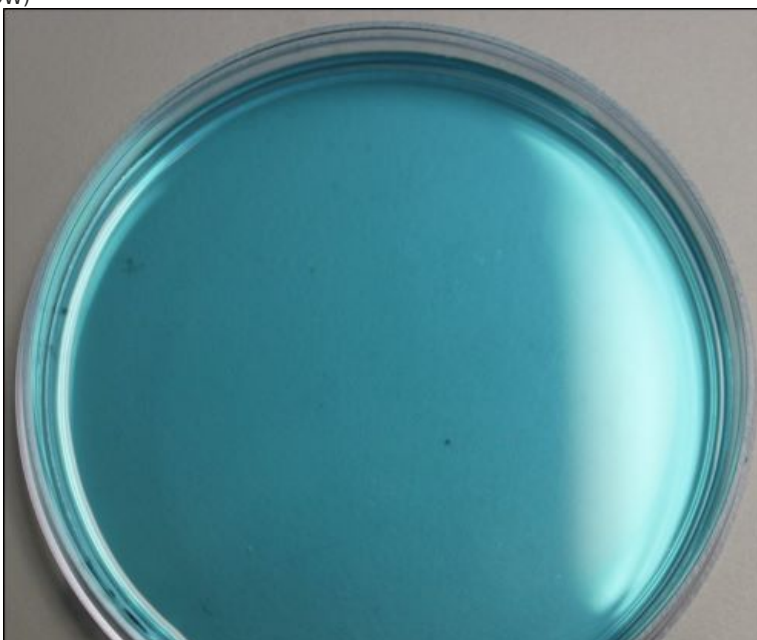




Photo 5: CuSO_4 Room Temperature
(SAMPLE ANSWER BELOW)

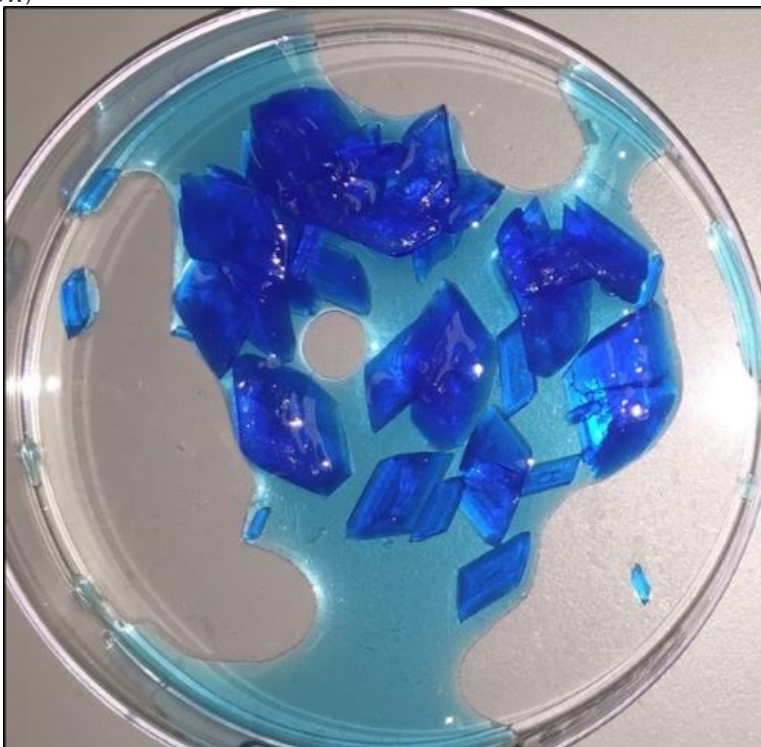
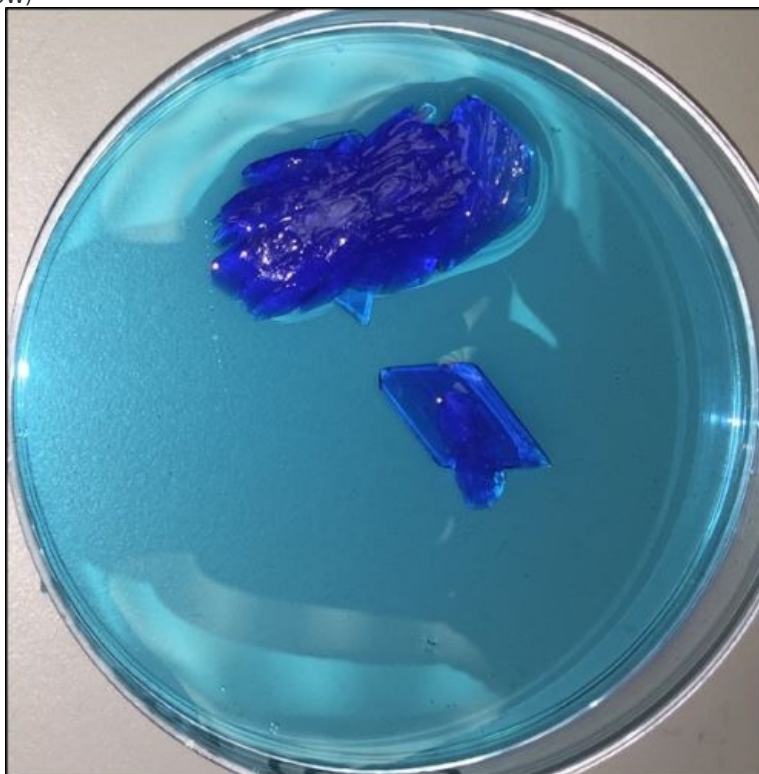




Photo 6: CuSO_4 Refrigerated
(SAMPLE ANSWER BELOW)



Competency Review

Which of the following is a method of crystal destruction?

- ☐ Solid-State Diffusion
- ☐ Precipitation from a Solution
- ☒ Dissolution ✓
- ☐ Biomineralization

Minerals form through precipitation of a gas occurs when hot gases or steam enter the atmosphere and abruptly cool.

- ☒ True ✓
- ☐ False

When fluid availability is increased from higher water content, crystal growth is promoted under longer geologic time scales.

- ☐ True
- ☒ False ✓

Which of the following environmental conditions will result in smaller crystal formation?

- ☐ Low Temperature
- ☒ Low Pressure
- ☐ Acidic Environments
- ☐ Slow Cooling



A student is growing crystals for her geology lab. She saturates a solution of aluminum sulfate and divides the solution in half into two beakers. She places one beaker in the refrigerator and one on a desk at room temperature. Which beaker can Michele expect to produce the smaller crystals?

- ☐ The beaker on the desk at room temperature
- ☒ The beaker in the refrigerator



_____ forms crystals when atoms or ions move through a solid to arrange into a new crystal structure.

- ☐ Precipitation
- ☐ Biomineralization
- ☐ Melting
- ☒ Solid-State Diffusion



Extension Questions

Describe how a single large crystal could be grown from a saturated CuSO_4 solution. Include an explanation of how the crystal continues to grow. (SAMPLE ANSWER BELOW)

In order to get one single crystal, a seed crystal is needed from an original batch of grown crystals. The seed crystal is then placed in a beaker of only saturated solution (no other crystals should be present), and the molecules from the solution will be attracted to the seed crystal and continue to add to the size. The beaker should be cleared of any small crystals that form so that the molecules will centralize on the seed crystal.