



The questions you read next will require you to answer in writing.

1. Write your answers on separate paper.

2. Be sure to write your name on each page.

- 1 Atomic size is one of many trends of the periodic table.
 - Describe one reason atomic size may vary among the elements of the periodic table.
 - List the correct order of aluminum, magnesium, phosphorus, silicon, sodium, and sulfur, based on decreasing atomic size.
- 2 During a laboratory experiment, 75 grams of water at 100°C is transformed into steam at 100°C.
 - Describe how this experiment confirms the law of conservation of energy.
 - How much heat energy is needed to completely change the state of the water? Show your work.
- 3 A compound contains the elements copper and chlorine in a ratio of 1 copper : 2 chlorine.
 - What is the empirical formula for this compound?
 - What is the percent composition of copper in this compound? Show your work.
 - What is the percent composition of chlorine in this compound? Show your work.



- 4 Acids are solutions with specific characteristics.
 - Describe the chemical reaction which occurs between an acid and a metal.
 - If a ribbon of magnesium and hydrochloric acid were combined, which products would result in this chemical reaction?
- 5 A solution containing 12.9 g of $MgCl_2$ is dissolved in water to make a 0.54-L solution.
 - What is the Molarity of the solution? Show your work.
 - Describe how decreasing the volume would affect the Molarity of the solution.



1. Atomic size is one of many trends of the periodic table.
Describe one reason atomic size may vary among the elements of the periodic table.

- List the correct order of aluminum, magnesium, phosphorus, silicon, sodium, and sulfur, based on decreasing atomic size.

Score 0 No response or the response does not address the prompt

Score 1 Fulfills only 1 of 2 requirements of a level 2 performance

Score 2 Describes a reason atomic size varies on the periodic table; sequences the elements in order of decreasing atomic size

2. During a laboratory experiment, 75 grams of water at 100°C is transformed into steam at 100°C .

- Describe how this experiment confirms the law of conservation of energy.
- How much heat energy is needed to completely change the state of the water? Show your work.

Score 0 No response or the response does not address the prompt

Score 1 Fulfills only 1 of 2 requirements of a level 2 performance

Score 2 Describes how the experiment follows the law of conservation of energy; calculates the amount of heat energy transferred during the phase change

3. A compound contains the elements copper and chlorine in a ratio of 1 copper : 2 chlorine.

- What is the empirical formula for this compound?
- What is the percent composition of copper in this compound? Show your work.
- What is the percent composition of chlorine in this compound? Show your work.

Score 0 No response or the response does not address the prompt

Score 1 Fulfills only 1 of 3 requirements of a level 3 performance

Score 2 Fulfills 2 of 3 requirements of a level 3 performance

Score 3 Determines the empirical formula for copper and chlorine; calculates the percent composition of copper; calculates the percent composition of chlorine

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4. Acids are solutions with specific characteristics.
Describe the chemical reaction which occurs between an acid and a metal.
If a ribbon of magnesium and hydrochloric acid were combined, which products would result in this chemical reaction?

Score 0 No response or the response does not address the prompt

Score 1 Fulfills only 1 of 2 requirements of a level 2 performance

Score 2 Describes the chemical reaction between an acid and a metal; identifies the products of the chemical reaction between magnesium and hydrochloric acid

5. A solution containing 12.9 g of MgCl_2 is dissolved in water to make a 0.54-L solution.

- What is the Molarity of the solution? Show your work.
- Describe how decreasing the volume would affect the Molarity of the solution.

Score 0 No response or the response does not address the prompt

Score 1 Fulfills only 1 of 2 requirements of a level 2 performance

Score 2 Calculates the Molarity of the solution; describes how decreasing the volume would affect the Molarity of the solution

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APPENDIX TO CONSTRUCTED RESPONSE KEY
CHEMISTRY



QID	Discrete Answers for Student Responses (* Student answers may vary.)
1	Score Point 1: * Score Point 2: Na, Mg, Al, Si, P, S
2	Score Point 1: * Score Point 2: 189,000 J
3	Score Point 1: CuCl_2 Score Point 2: 47 % Score Point 3: 53 %
4	Score Point 1: * Score Point 2: hydrogen gas (H_2) and magnesium chloride/salt (MgCl_2)
5	Score Point 1: 0.25 M Score Point 2: *

Revised