

2008 AP[®] CHEMISTRY FREE-RESPONSE QUESTIONS (Form B)

Answer Question 5 and Question 6. The Section II score weighting for these questions is 15 percent each.

Your responses to these questions will be graded on the basis of the accuracy and relevance of the information cited. Explanations should be clear and well organized. Examples and equations may be included in your responses where appropriate. Specific answers are preferable to broad, diffuse responses.

5. The identity of an unknown solid is to be determined. The compound is one of the seven salts in the following table.

$\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$	$\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$	CaCO_3	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
NaCl	BaSO_4	$\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$	

Use the results of the following observations or laboratory tests to explain how each compound in the table may be eliminated or confirmed. The tests are done in sequence from (a) through (e).

- (a) The unknown compound is white. In the table below, cross out the two compounds that can be eliminated using this observation. Be sure to cross out these same two compounds in the tables in parts (b), (c), and (d).

$\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$	$\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$	CaCO_3	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
NaCl	BaSO_4	$\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$	

- (b) When the unknown compound is added to water, it dissolves readily. In the table below, cross out the two compounds that can be eliminated using this test. Be sure to cross out these same two compounds in the tables in parts (c) and (d).

$\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$	$\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$	CaCO_3	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
NaCl	BaSO_4	$\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$	

- (c) When $\text{AgNO}_3(aq)$ is added to an aqueous solution of the unknown compound, a white precipitate forms. In the table below, cross out each compound that can be eliminated using this test. Be sure to cross out the same compound(s) in the table in part (d).

$\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$	$\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$	CaCO_3	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
NaCl	BaSO_4	$\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$	