



AP[®] Chemistry 2002 Sample Student Responses Form B

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Your responses to the rest of the questions in this part of the examination 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.

Answer BOTH Question 5 below AND Question 6 printed on page 18. Both of these questions will be graded. The Section II score weighting for these questions is 30 percent (15 percent each).

5. Consider five unlabeled bottles, each containing 5.0 g of one of the following pure salts.



- (a) Identify the salt that can be distinguished by its appearance alone. Describe the observation that supports your identification.
- (b) Identify the salt that can be distinguished by adding 10 mL of H₂O to a small sample of each of the remaining unidentified salts. Describe the observation that supports your identification.
- (c) Identify a chemical reagent that could be added to the salt identified in part (b) to confirm the salt's identity. Describe the observation that supports your confirmation.
- (d) Identify the salt that can be distinguished by adding 1.0 M Na₂SO₄ to a small sample of each of the remaining unidentified salts. Describe the observation that supports your identification.
- (e) Identify the salt that can be distinguished by adding 1.0 M NaOH to a small sample of each of the remaining unidentified salts. Describe the observation that supports your identification.

(a) CoCl₂ is the only salt that has color, a bluish powder.

(b) AgCl is insoluble in water, whereas the remaining salts are. Therefore AgCl will be the unclear solution.

(c) Putting in excess concentrated ammonia will make $[Ag(NH_3)_2]^+$ which makes it dissolve.

(d) Barium sulfate precipitates out, therefore the solution that makes a ppt. when Na₂SO₄ is added will contain BaCl₂.

(e) When OH⁻ is added to NH₄⁺, NH₄OH (or NH₃ and H₂O) is formed. This gives off a strong odor, therefore the salt that emits this smell contains NH₄Cl.

GO ON TO THE NEXT PAGE.

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a) NaCl can be distinguished by appearance alone because it is common table salt, a white crystal

b) AgCl, in water would form the white precipitate AgCl(s)

c) NH₃(aq) ammonia could be added, which would form a complex ion with Ag & get rid of the precipitate =

$$AgCl + NH_3 \rightarrow [Ag(NH_3)_2]^+ + Cl^-$$

d) BaCl₂ when added to Na₂SO₄ will form a BaSO₄ precipitate

$$BaCl_2 + SO_4^{2-} \rightarrow BaSO_4(s) + Cl^-$$

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5B₂

ADDITIONAL PAGE FOR ANSWERING QUESTION 5.

e) NH_4Cl , forms ammonia gas & water:
 $\text{NH}_4\text{Cl} + \text{OH}^- \rightarrow \text{NH}_3 + \text{H}_2\text{O} + \text{Cl}^-$
ammonia has a distinctive smell