

AP CHEMISTRY LAB FINAL



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Purpose:

To identify 12 unknown substances using 3 verifying tests to each substance.

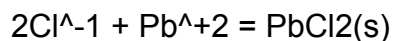
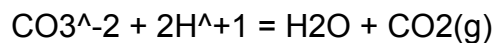
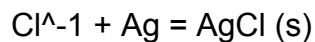
18A = HCl (Liquid)

Description of the substance from your observations:

Clear liquid with no smell

Test performed**Result of Test**

Test performed	Result of Test
PH test	PH=1
Mixed with KI	No precipitate
Mixed with Pb(C ₂ H ₃ O ₂) ₂ solution	White precipitate forms
Mixed with H ₂ O	No precipitate
Mixed with BaCl ₂	No precipitate
Mixed with CH ₃ COOH	No precipitate
Mixed with NaCl	No precipitate
Mixed with ethanol	No precipitate
Mixed with NaOH	No precipitate
Mixed with CaCO ₃ solution	Bubbles form
Mixed with Na ₂ SO ₄	No precipitate
Mixed with AgNO ₃	White precipitate forms
Smell test	No smell

Net Ionic Equations:**Reasons for Verification:** list and explain (minimum of 3)

When AgNO_3 was added to HCl the Ag^+ ion replaced the H^+ ion which then created the AgCl precipitate.

When CaCO_3 was added to HCl the H^+ ion replaced the Ca^+ ion which is then broken down into H_2O and CO_2 where CO_2 was a gas which created the bubbling during the reaction.

The $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$ and HCl caused Pb^+ ion to take the place of the H^+ ion creating the PbCl_2 precipitate

18B = KI (Solid)

Description of the substance from your observations:

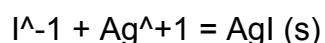
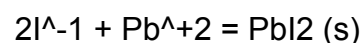
White grain like solid that stuck to the side of the vial, had no smell.

Test performed**Result of Test**

Test performed	Result of Test
PH test	PH=5
Mixed with $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$ solution	Bright yellow precipitate forms
Mixed with AgNO_3	Pale yellow precipitate forms
Solubility in distilled water	Soluble
Mixed with HCl	No precipitate
Mixed with H_2O	No precipitate
Mixed with BaCl_2	No precipitate
Mixed with CH_3COOH	No precipitate

Mixed with NaCl	No precipitate
Mixed with ethanol	No precipitate
Mixed with NaOH	No precipitate
Mixed with CaCO ₃	No precipitate
Mixed with Na ₂ SO ₄	No precipitate

Net Ionic Equations:

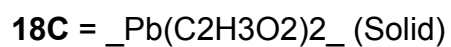


Reasons for Verification: list and explain (minimum of 3)

When Pb(C₂H₃O₂)₂ was mixed with the KI the Pb⁺² ion replaced the K⁺ ion creating the bright yellow precipitate of PbI₂.

When AgNO₃ was mixed with KI the Ag⁺ ion replaced the K⁺ ion creating a precipitate. Soluble in distilled water

KI only had a Ph of 5 so it was slightly acidic and it was soluble in distilled water allowing for an aqueous solution to be tested.



Description of the substance from your observations:

Large white solid with no smell

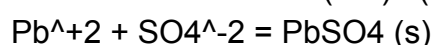
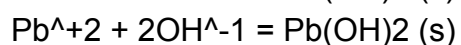
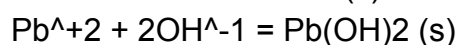
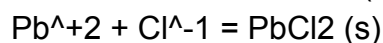
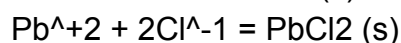
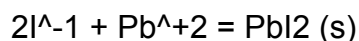
Test performed

Result of Test

PH test	PH=6
Mixed with BaCl solution	Light grey precipitate forms

Mixed with NaCl solution	Light grey precipitate forms
Mixed with NaOH	White precipitate forms
Mixed with Na ₂ SO ₄ solution	White precipitate forms
Mixed with HCl	White precipitate
Mixed with KI	Bright yellow precipitate
Mixed with AgNO ₃	No reaction
Mixed with H ₂ O	No precipitate
Mixed with CH ₃ COOH	No precipitate
Mixed with ethanol	No precipitate
Mixed with CaCO ₃	No precipitate

Net Ionic Equations:



Reasons for Verification: list and explain (minimum of 3)

The I⁻ ion took the place of C₂H₃O₂⁻ ion which created the PbI₂ solid which was shown as a bright yellow precipitate.

Cl⁻ ion replaces C₂H₃O₂⁻ ion giving the lab PbCl₂ shown through a light grey precipitate

Cl⁻ ion in HCl replaces C₂H₃O₂⁻ creating PbCl₂ as a white precipitate ion

2OH⁻ took the place of C₂H₃O₂⁻ giving Pb(OH)₂ solid shown as a white precipitate.

Pb⁺ ion took the place of Ca⁺ ion in Ca(OH)₂ giving Pb(OH)₂ as a light grey precipitate.
Pb⁺ ion took the place of Na⁺ ion in Na₂SO₄ giving a white precipitate as PbSO₄

18D = H₂O (liquid)

Description of the substance from your observations:

Clear liquid with no smell

Test performed	Result of Test
PH test	PH=7
Swipe test	Took same amount of time to evaporate as distilled water
Miscibility with ethanol	Miscible
Mixed with HCl	No precipitate
Mixed with KI	No precipitate
Mixed with Pb(C ₂ H ₃ O ₂) ₂	No precipitate
Mixed with BaCl	No precipitate
Mixed with CH ₃ COOH	No precipitate
Mixed with NaCl	No precipitate
Mixed with ethanol	No precipitate
Mixed with NaOH	No precipitate
Mixed with CaCO ₃	No precipitate
Mixed with Na ₂ SO ₄	No precipitate
Mixed with AgNO ₃	No precipitate

Net Ionic Equations:

No chemical reactions occurred

Reasons for Verification: list and explain (minimum of 3)

Ph is 7 and 7 is the neutral Ph and water should be neutral

Water was miscible with ethanol, which was in vial H. Since ethanol is a strong alcohol it should be miscible in water. The two liquids were not layered and were mixed together without having to shake or stir the solution.

Vial D took the same amount of time to evaporate off the lab table when it was put onto the table then quickly, but not completely, wiped with paper towel when compared to the distilled water.

Lastly absolutely no reactions occurred which gives a good indicator that vile D is H₂O.

18E = BaCl (solid)

Description of the substance from your observations:

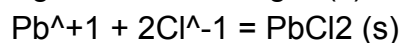
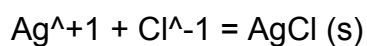
White solid with no smell

Test performed**Result of Test**

Test performed	Result of Test
PH test	PH=4
Mixed with AgNO ₃	White precipitate formed
Mixed with Pb(C ₂ H ₃ O ₂) ₂ solution	Light grey precipitate formed
Mixed with HCl	No precipitate
Mixed with KI	No precipitate
Mixed with H ₂ O	No precipitate

Mixed with CH ₃ COOH	No precipitate
Mixed with NaCl	No precipitate
Mixed with ethanol	No precipitate
Mixed NaOH	No precipitate
Mixed with CaCO ₃	No precipitate
Mixed with Na ₂ SO ₄	No precipitate

Net Ionic Equations:



Reasons for Verification: list and explain (minimum of 3)

When AgNO₃ was added to BaCl₂ the Ag⁺ ion replaced the Ba⁺ ion which then created the AgCl precipitate.

Cl⁻ ion replaces C₂H₃O₂⁻ ion giving the lab PbCl₂ shown through a light grey precipitate.

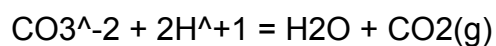


Description of the substance from your observations:

Clear liquid that smells like vinegar

Test performed	Result of Test
PH test	PH=2
smell	Smells like vinegar
Mixed with CaCO ₃ solution	Bubbles formed
Mixed with HCl	No precipitate
Mixed with KI	No precipitate
Mixed with Pb(C ₂ H ₃ O ₂) ₂	No precipitate
Mixed with H ₂ O	No precipitate
Mixed with BaCl ₂	No precipitate
Mixed with NaCl	No precipitate
Mixed with ethanol	No precipitate
Mixed with NaOH	No precipitate
Mixed with Na ₂ SO ₄	No precipitate
Mixed with AgNO ₃	No precipitate

Net Ionic Equations:



Reasons for Verification: list and explain (minimum of 3)

When CaCO₃ is added to CH₃COOH the H⁺ replaces the Ca⁺² this creates H₂CO₃ which is broken down into H₂O and CO₂ where CO₂ is a gas so it showed bubbles during the reaction.

CH₃COOH smelled like vinegar with a PH of 2 and the only vile in this lab that could possibly smell like vinegar is the acetic acid.

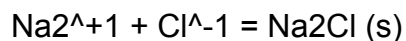
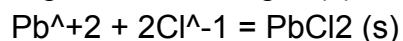
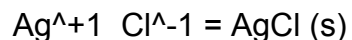
CH₃COOH has a Ph of 2 and CH₃COOH is an acid because it is also known as acetic acid so the Ph of 2 made sense and helped me conclude which substance other than HCl had an acidic Ph.

18G= NaCl (liquid)

Description of the substance from your observations:

Clear liquid with no smell.

Test performed	Result of Test
PH test	PH=5
Mixed with NaOH	Light grey precipitate
Mixed with Na ₂ SO ₄	White precipitate
Mixed with AgNO ₃	White precipitate
Mixed with Pb(C ₂ H ₃ O ₂) ₂ solution	Light grey precipitate
Mixed with HCl	No precipitate
Mixed with KI	No precipitate
Mixed with H ₂ O	No precipitate
Mixed with BaCl ₂	No precipitate
Mixed with CH ₃ COOH	No precipitate
Mixed with ethanol	No precipitate
Mixed with CaCO ₃	No precipitate

Net Ionic Equations:**Reasons for Verification:** list and explain (minimum of 3)

The Cl⁻ ion replaced the NO₃⁻ ion which showed a white precipitate when the reaction occurred giving AgCl

Cl⁻ ion in HCl replaces C₂H₃O₂⁻ creating PbCl₂ as a white precipitate ion

Na₂SO₄ mixed with NaCl gave a white precipitate of Na₂Cl

18H= Ethanol (liquid)

Description of the substance from your observations:

Clear liquid that had a strong smell of alcohol.

Test performed**Result of Test**

Test performed	Result of Test
PH test	PH=5
Smell	Smells like alcohol
Swipe test	Evaporated fast off the table
Mixed with HCl	No precipitate
Mixed with KI	No precipitate
Mixed with Pb(C ₂ H ₃ O ₂) ₂	No precipitate
Mixed with H ₂ O	No precipitate

Mixed with BaCl ₂	No precipitate
Mixed with CH ₃ COOH	No precipitate
Mixed with NaCl	No precipitate
Mixed with Na ₂ SO ₄	No precipitate
Mixed with NaOH	No precipitate
Mixed with CaCO ₃	No precipitate
Mixed with AgNO ₃	No precipitate
Miscibility with water	Miscible

Net Ionic Equations

No chemical reactions took place

Reasons for Verification: list and explain (minimum of 3)

Vial H had a very strong smell of alcohol and Ethanol was the only substance that had this kind of smell in the lab.

This liquid evaporated almost immediately as it was wiped on the table. This happens with alcohols and ethanol was the only liquid that did this.

Water was miscible with ethanol, which was in vial D. Since ethanol is a strong alcohol it should be miscible in water. The two liquids were not layered and were mixed together without having to shake or stir the solution.

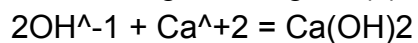
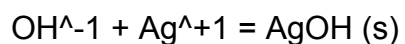
18I= NaOH (liquid)

Description of the substance from your observations:

Clear liquid with no smell.

Test performed**Result of Test**

Test performed	Result of Test
PH test	PH=11
Mixed with CaCO ₃	Grainy precipitate
Mixed with AgNO ₃	Brown precipitate
Mixed with NaCl	Light grey precipitate
Mixed with HCl	No precipitate
Mixed with KI	No precipitate
Mixed with Pb(C ₂ H ₃ O ₂) ₂	White precipitate
Mixed with H ₂ O	No precipitate
Mixed with BaCl ₂	No precipitate
Mixed with CH ₃ COOH	No precipitate
Mixed with ethanol	No precipitate
Mixed with Na ₂ SO ₄	No precipitate

Net Ionic Equations:

Reasons for Verification: list and explain (minimum of 3)

Ag⁺ ion in AgNO₃ replaced Na⁺ ion giving a solid of AgOH which is shown as brown precipitate.

Ca²⁺ ion in CaCO₃ replaces the Na⁺ ion which would show Ca(OH)₂ as a grainy white precipitate.

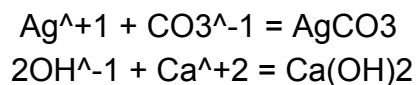
When NaOH and NaCl were mixed they created a light grey precipitate.

18J= CaCO₃ (solid)

Description of the substance from your observations:

White powdery solid, some solid stuck to the side of the vial. No smell.

Test performed	Result of Test
PH test	PH=8
Mixed with AgNO ₃	Brown precipitate
Mixed with HCl	Bubbles formed quickly
Mixed with CH ₃ COOH	Bubbles formed
Mixed with NaOH	Grainy precipitate
Mixed with KI	No precipitate
Mixed with Pb(C ₂ H ₃ O ₂) ₂	No precipitate
Mixed with H ₂ O	No precipitate
Mixed with BaCl ₂	No precipitate
Mixed with NaCl	No precipitate
Mixed with ethanol	No precipitate
Mixed with Na ₂ SO ₄	No precipitate

Net Ionic Equations:**Reasons for Verification:** list and explain (minimum of 3)

When CaCO_3 was added to HCl the H^+ ion replaced the Ca^+ ion which is then broken down into H_2O and CO_2 where CO_2 was a gas which created the bubbling during the reaction.

When CaCO_3 is added to CH_3COOH the H^+ replaces the Ca^{+2} this creates H_2CO_3 which is broken down into H_2O and CO_2 where CO_2 is a gas so it showed bubbles during the reaction.

Ag^+ ion replaced the Ca^+ ion from CaCO_3 and gave us a brown precipitate that was AgCO_3

2OH^- ion replaced the OH_3^- ion which gave us a precipitate of Ca(OH)_2 that was a grainy white precipitate.

18K= Na_2SO_4 (solid)

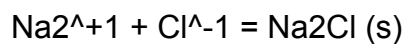
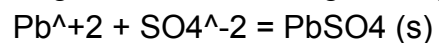
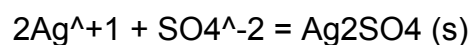
Description of the substance from your observations:

White solid with no smell.

Test performed**Result of Test**

PH test	PH=4
Mixed with AgNO ₃	Brown precipitate formed
Mixed with Pb(C ₂ H ₃ O ₂) ₂	White precipitate formed
Mixed with NaCl	White precipitate formed
Mixed with HCl	No precipitate
Mixed with KI	No precipitate
Mixed with H ₂ O	No precipitate
Mixed with BaCl ₂	No precipitate
Mixed with CH ₃ COOH	No precipitate
Mixed with ethanol	No precipitate
Mixed with NaOH	No precipitate
Mixed with CaCO ₃	No precipitate

Net Ionic Equations:



Reasons for Verification: list and explain (minimum of 3)

2Ag⁺ ion in AgNO₃ replaced the Na⁺ ion from Na₂SO₄ and formed a brown precipitate of Ag₂SO₄.

Pb²⁺ ion replaced the Na⁺ in this situation and showed PbSO₄ which was a white precipitate.

Na₂SO₄ mixed with NaCl gave a white precipitate of Na₂Cl

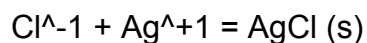
18L= AgNO₃ (liquid)

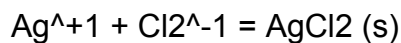
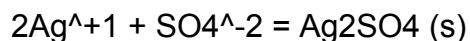
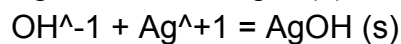
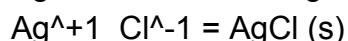
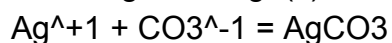
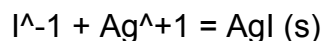
Description of the substance from your observations:

Clear liquid with no smell

Test performed	Result of Test
PH Test	PH=4
Mixed with HCl	White precipitate formed
Mixed with KI	Pale yellow precipitate
Mixed with BaCl ₂	White precipitate formed
Mixed with CaCO ₃	Brown precipitate formed
Mixed with NaCl	White precipitate formed
Mixed with NaOH	Brown precipitate formed
Mixed with Na ₂ SO ₄	Light blue precipitate formed
Mixed with Pb(C ₂ H ₃ O ₂) ₂	No precipitate formed
Mixed with H ₂ O	No precipitate formed
Mixed with ethanol	No precipitate formed
Mixed with CH ₃ COOH	No precipitate formed

Net Ionic Equations:





Reasons for Verification: list and explain (minimum of 3)

2Ag⁺ ion in AgNO₃ replaced the Na₂⁺ ion from Na₂SO₄ and formed a brown precipitate of Ag₂SO₄.

Ag⁺ ion in AgNO₃ replaced Na⁺ ion giving a solid of AgOH which is shown as brown precipitate.

The Cl⁻ ion replaced the NO₃⁻ ion which showed a white precipitate when the reaction occurred giving AgCl

Ag⁺ ion replaced the Ca⁺ ion from CaCO₃ and gave us a brown precipitate that was AgCO₃

When AgNO₃ was mixed with KI the Ag⁺ ion replaced the K⁺ ion creating a precipitate. Soluble in distilled water

When AgNO₃ was added to HCl the Ag⁺ ion replaced the H⁺ ion which then created the AgCl precipitate.

When AgNO₃ was added to BaCl₂ the Ag⁺ ion replaced the Ba⁺ ion which then created the AgCl precipitate.

