Student worksheet: Testing for negative ions – making observations

This activity is in two parts. In the first part you observe the reactions of various negative ions and in the second you use those observations to identify unknown solutions.

Use the table **Tests for negative ions** to record your observations during each test. Use a clean test-tube each time or wash up thoroughly between tests using distilled or deionised water to avoid contamination. Use a small portion of the test solution each time (no more than 1 cm^3).

Write balanced symbol equations for the reaction that occurs in each of the tests (except the test for a nitrate).

Health and safety

Wear eye protection. Take extra care when dealing with unknown solutions.

At the concentrations used in this experiment:

- Barium chloride solution is **harmful;** wash your hands after use.
- Sodium hydroxide is an **irritant.**
- Ammonia solution can give off ammonia vapour, which can **irritate** the eyes and lungs.
- Keep the lid on the bottle when not in use.
- Nitric acid is an **irritant**.
- Silver nitrate can stain skin and clothes.

Tests for negative ions

Negative ion	Test	Observations
CO_3^{2-} carbonate	Put a small amount of limewater into a test-tube (no more than 1 cm^3). Put your sample in a separate test-tube and add a few drops of hydrochloric acid. Using a pipette, collect the gas given off and bubble it through the limewater. (Note: you can also do this test on a solid sample.)	
Cl^- chloride	Add a few drops of dilute nitric acid followed by a few drops of silver nitrate solution. Let the mixture stand for a few minutes and then add some ammonia solution.	
Br^- bromide	Add a few drops of dilute nitric acid followed by a few drops of silver nitrate solution. Let the mixture stand for a few minutes and then add some ammonia solution.	
I^- iodide	Add a few drops of dilute nitric acid followed by a few drops of silver nitrate solution. Let the mixture stand for a	

	few minutes and then add some ammonia solution.	
SO_4^{2-} sulfate	Add a few drops of barium chloride solution and then a few drops of hydrochloric acid.	
NO_3^- nitrate	Add a few drops of sodium hydroxide solution and a little aluminium powder. Warm the solution in a Bunsen flame and test any gas given off using red litmus paper.	

Student worksheet: Testing for negative ions – Identifying unknowns

Using the observations chart you made in **Testing for negative ions – making observations,** test the unknown solutions provided and identify the negative ions present. Make careful observations, including any negative results. You may need to try a number of tests before you get a positive result. Design a table to record your observations. You may wish to use the headings: Unknown sample; Test tried; Observations; and Conclusion.

Health and safety

Wear eye protection. Take extra care when dealing with unknown solutions.

At the concentration used in this experiment:

- Barium chloride solution is **harmful;** wash your hands after use.
- Sodium hydroxide is an **irritant.**
- Ammonia solution can give off ammonia vapour, which can **irritate** the eyes and lungs.
- Keep the lid on the bottle when not in use.
- Nitric acid is an **irritant**.
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Credits

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