

## Testing for negative ions – student sheet

### Introduction

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<sup>3</sup>). Write balanced symbol equations for the reaction that occurs in each of the tests (except the test for a nitrate).

### Health, safety and technical notes

- Read our standard health and safety guidance here <https://rsc.li/3O5xB9s>
- Always wear eye protection.
- Barium chloride solid is toxic; the 0.1 mol dm<sup>-3</sup> solution is harmful. Wash your hands after use and warn students to do the same. (See CLEAPSS Hazcard HC010a)
- Ammonia solution is an irritant when concentrated, but not at the concentrations used by students in this activity. However, it can give off ammonia vapour, which can irritate the eyes and lungs. Keep the lid on the bottle when not in use. (See CLEAPSS Hazcard HC006)
- Nitric acid is an irritant. (See CLEAPSS Hazcard HC067)
- Silver nitrate solution can stain skin and clothes. (See CLEAPSS Hazcard HC087)

### Procedure

Negative ion	Test	Observation
<b>CO<sub>3</sub><sup>2-</sup> carbonate</b>	Put a small amount of limewater into a test tube (no more than 1 cm <sup>3</sup> ). 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.)	
<b>Cl<sup>-</sup> chloride</b>	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.	
<b>Br<sup>-</sup> bromide</b>	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.	
<b>I<sup>-</sup> iodide</b>	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	
<b>SO<sub>4</sub><sup>2-</sup> sulfate</b>	Add a few drops of barium chloride solution and then a few drops of hydrochloric acid	
<b>NO<sub>3</sub><sup>-</sup> nitrate</b>	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.	

## Notes

Using the observations chart you made above, 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 new table to record your observations.

You may wish to use the headings: Unknown sample; Test tried; Observations; and Conclusion.