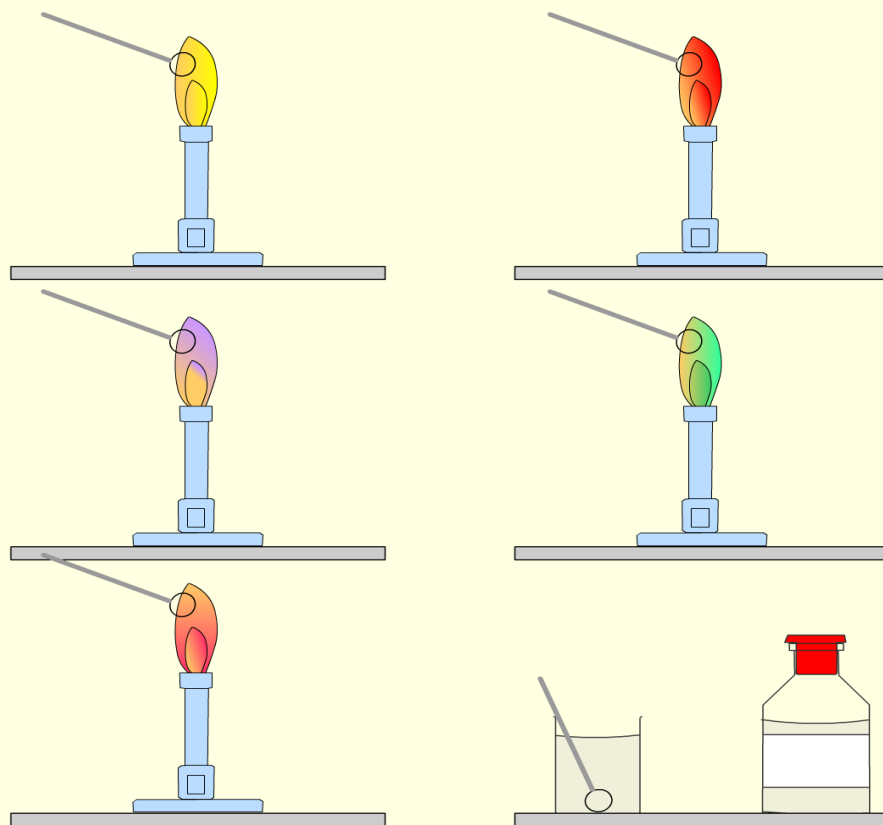


Tests for cations

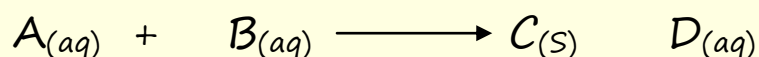
Answer all the questions below then check your answers.

1. Flame tests can be used to identify the presence of certain metal ions. Beside each picture of a coloured Bunsen flame below write the name of the metal ion responsible for colouring the flame.

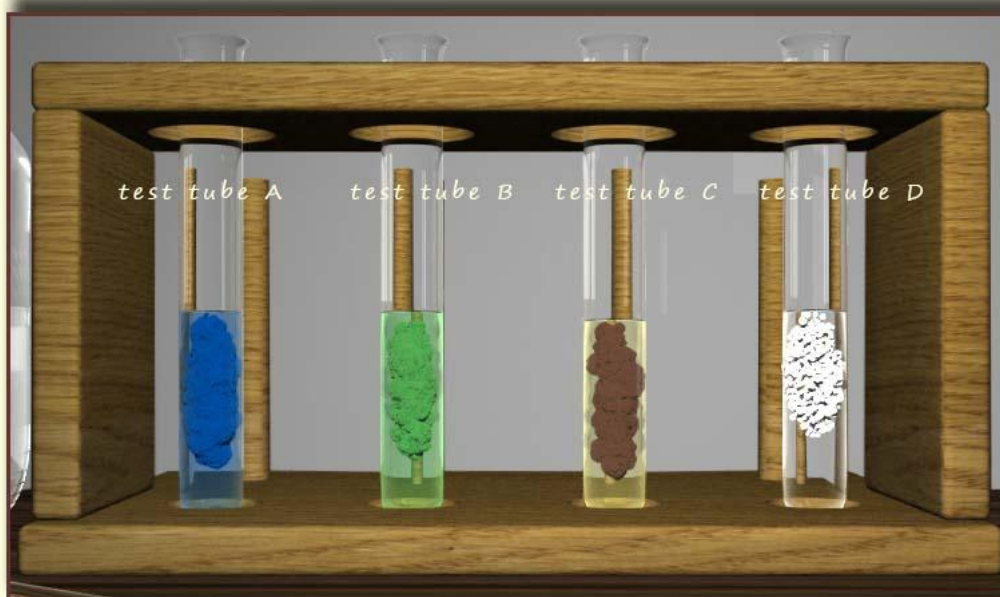


2. Which metal is the wire loop made from? What is it cleaned in before and after each test?

3. Why does potassium chloride and potassium bromide give the same flame colour?
4. What is a precipitation reaction?
5. Study the reaction shown below:



- a. What does the (aq) symbol mean in the above equation?
 - b. What does the (s) symbol mean in the above equation?
 - c. Name the precipitate formed in the above equation.
6. Which metal ions produce coloured precipitates when an alkaline solution such as sodium hydroxide is added to them? (do not name individual metal ions here)
 7. Identify the metal ions responsible for the precipitates formed in the test tubes below:

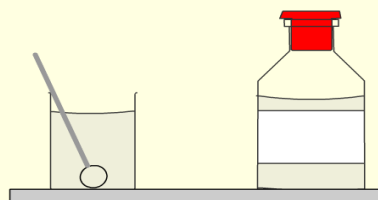
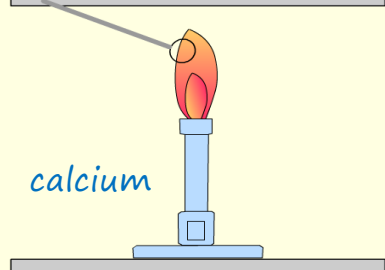
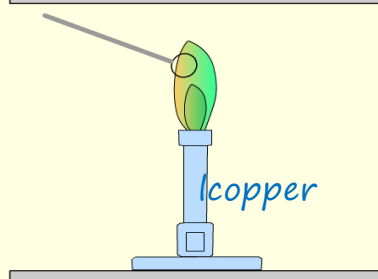
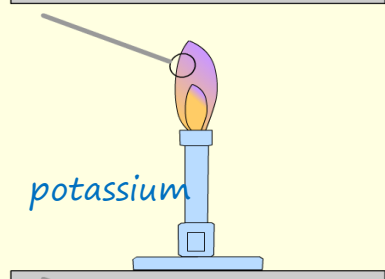
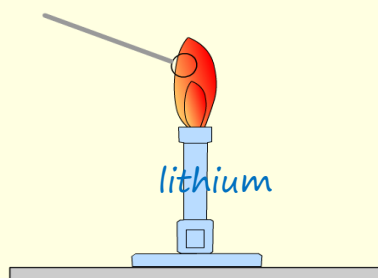
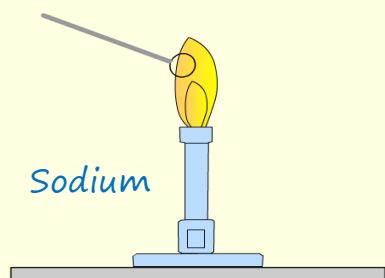


- b. When sodium hydroxide is added to a solution of iron (II) chloride a green coloured precipitate was formed. Write a word and balanced symbolic equation for this reaction. If you need help with working out formula then go to the page on [finding the formula](#)
- c. Why can you not be sure which metal ion produced the colourless (white) precipitate in test tube D? What further tests would be needed in order to positively identify the metal ion present?
8. What is the difference between ammonium and ammonia?
- a. What is red and blue litmus paper used to test for?
- b. Explain how to test for ammonium ions in a sample of an unknown substance.

Tests for cations

Answers

1. Flame tests can be used to identify the presence of certain metal ions. Beside each picture of a coloured Bunsen flame below write the name of the metal ion responsible for colouring the flame.



2. Which metal is the wire loop made from? What is it cleaned in before and after each test? Platinum as it is an inert metal, it is cleaned to ensure there is no cross contamination between samples.

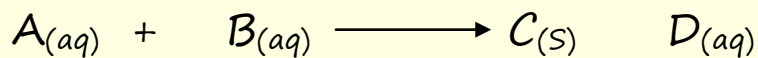
3. Why does potassium chloride and potassium bromide give the same flame colour?

Both contain potassium ions, it is the metal ion which is responsible for the colour, not the non-metal.

4. What is a precipitation reaction?

One where two solutions mix to produce an insoluble solid, this insoluble solid is called the precipitate.

5. Study the reaction shown below:



- What does the (aq) symbol mean in the above equation? *Aqueous, it's a solution.*
 - What does the (s) symbol mean in the above equation? *solid*
 - Name the precipitate formed in the above equation. *Precipitate is the insoluble solid C*
6. Which metal ions produce coloured precipitates when an alkaline solution such as sodium hydroxide is added to them? (do not name individual metal ions here)

Transition metal ions

7. Identify the metal ions responsible for the precipitates formed in the test tubes below:

Test tube A: copper ions Cu^{2+}

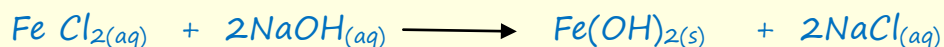
Test tube A: iron ions Fe^{2+}

Test tube A: iron ions Fe^{3+}

Test tube A: could be magnesium, calcium or aluminium ions, all produce a white colourless precipitate, Mg^{2+} or Ca^{2+} or Al^{3+}

- b. When sodium hydroxide is added to a solution of iron (II) chloride a green coloured precipitate was formed. Write a word and balanced symbolic equation for this reaction.

Iron(II) chloride + sodium hydroxide iron hydroxide + sodium chloride



- c. Why can you not be sure which metal ion produced the colourless (white) precipitate in test tube D? What further tests would be needed in order to positively identify the metal ion present? Aluminium calcium and magnesium all give white or colourless precipitates. To identify which metal you have:

- Add more sodium hydroxide slowly, if the precipitates dissolves then the ion present is Al^{3+}
- Carry out a flame test to distinguish between calcium and magnesium ions. Calcium ions have a red flame colour, magnesium ions give no colour.

8. What is the difference between ammonium and ammonia?

Ammonia is a small covalent molecule with pungent smell, NH_3 . Ammonium, NH_4^+ are positively charged ions found in an ionic compound.

- a. What is red and blue litmus paper used to test for?

Red litmus turn blue in alkaline conditions

Blue litmus turns red in acidic conditions.

b. Explain how to test for ammonium ions in a sample of an unknown substance.

- Dissolve the sample in water
- Add a strong alkali such as sodium hydroxide
- Warm on a gentle Bunsen flame
- Test for presence of ammonia using red litmus paper