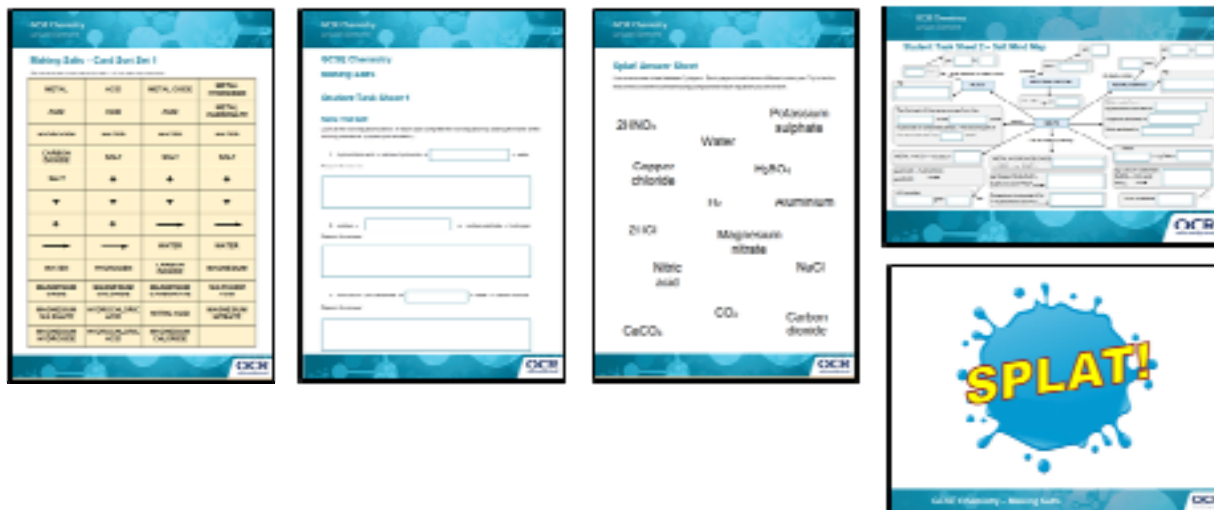


GCSE Chemistry

Making Salts

Instructions and answers for teachers



The Activity:

Learning Outcomes:

- To be able to recall the names and chemical formulae for commonly used acids
- To understand how salts can be made and write word equations for these reactions
- To be able to write the chemical formulae for salt reactions and predict products formed



This activity offers an opportunity for English skills development.

Associated materials:

'Making salts' card sort, 'Making salts' Student Task Sheet 1, 'Making salts' Student Task Sheet 2, 'Making salts' Splat PowerPoint, 'Making salts' Splat Answer Sheet

Introduction to the Task

This group of activities can be used to aid the delivery of the topic of salts. There are practical activities that can be undertaken to teach salts but learners often find writing the associated equations very difficult. They will need to have prior knowledge of chemical names and how to write chemical formulae alongside an understanding of ionic bonding will aid writing equations correctly.

Learners find the skill and understanding behind balancing equations difficult. They often confuse the reactants and products of the different types of salt reactions.

Notes for teachers

Activity 1: Salts Card Sort

Apparatus: Salts Card Sort Sheet

This activity is a card sort to aid kinaesthetic learning or can be used as a consolidation activity. The three sheets need to be printed in three different colours. Learners are to organise the first set of cards to show the general equations for making salts plus an example of each.

Suggested Answers:

Metal + acid \rightarrow salt + hydrogen

Magnesium + sulphuric acid \rightarrow magnesium sulphate + hydrogen

Metal oxide + acid \rightarrow salt + water

Magnesium oxide + Hydrochloric acid \rightarrow magnesium chloride + water

Metal hydroxide + acid \rightarrow salt + water

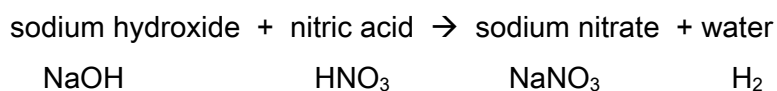
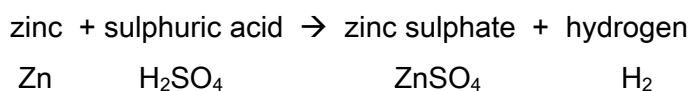
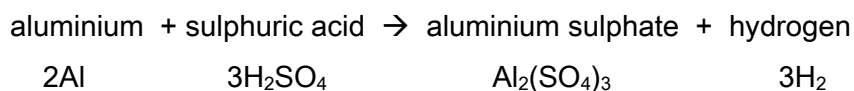
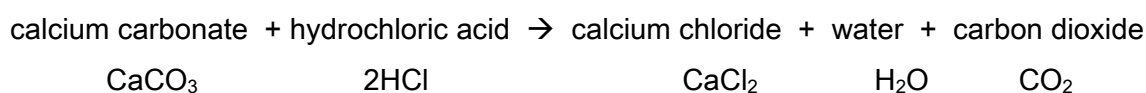
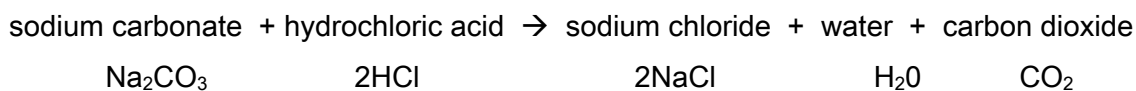
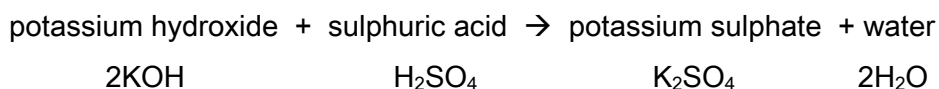
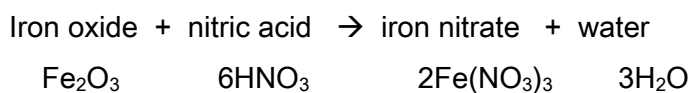
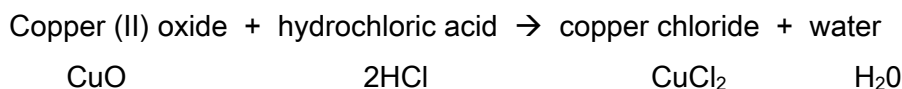
Magnesium hydroxide + nitric acid \rightarrow magnesium nitrate + water

Metal carbonate + acid \rightarrow salt + water + carbon dioxide

Magnesium carbonate + hydrochloric acid \rightarrow magnesium chloride + water + carbon dioxide

Learners now need to organise the second set of cards to show other examples of reactions that make salts. Then they need to organise the third set of cards underneath each reaction placed on the table from set 2. These give the chemical formula of the reactions made from the second set of cards.

Suggested Answers:



Extension idea: Learners may also be stretched further by being asked to balance the equations by writing numbers on the third set of cards.

Activity 2: Name that salt!

Apparatus: Learner Activity Sheet 1 - Name that salt!

Learners complete the worksheet, explaining how they have named the missing substance. You may want to write an example on the board and discuss the reasons as a class first, depending on the ability of the class.

Suggested answers:

Suggested explanations are provided here, however depending upon the ability of the learners and the depth to which ideas about reactions have been studied, teachers may want to add to/reduce the explanations.

1. hydrochloric acid + calcium hydroxide → **calcium chloride** + water

In this type of reaction a salt is formed from an acid and an alkali.

As the reacting alkali is calcium hydroxide, then the product will be a calcium salt.

As the reacting acid is hydrochloric acid, then the salt produced will be a chloride.

2. sodium + **sulphuric acid** → sodium sulphate + hydrogen

In this type of reaction an acid reacts with a metal to produce a salt and hydrogen.

As the salt produced is a sulphate, the reacting acid must be sulphuric acid,

3. nitric acid + zinc carbonate → **zinc nitrate** + water + carbon dioxide

In this type of reaction an acid reacts with a carbonate to give a salt, water and carbon dioxide.

As the reacting alkali is zinc carbonate, the product will be a zinc salt.

As the acid used is nitric acid, the salt produced will be a nitrate.

4. sulphuric acid + aluminium oxide → **aluminium sulphate** + water

In this type of reaction a salt is formed from an acid and an alkali.

As the reacting alkali is aluminium oxide, then the product will be an aluminium salt.

As the reacting acid is sulphuric acid, then the salt produced will be a sulphate.

Complete the Following Equations:

1. lead oxide + hydrochloric acid → lead chloride + water
2. Sodium carbonate + nitric acid → sodium nitrate + water + carbon dioxide
3. calcium + sulphuric acid → calcium sulphate + hydrogen
4. copper hydroxide + nitric acid → copper nitrate + water
5. lithium carbonate + sulphuric acid → lithium sulphate + water + carbon dioxide
6. tin + nitric acid → tin nitrate + hydrogen
7. $\text{CuO} + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{H}_2\text{O}$
8. $\text{ZnCO}_3 + 2\text{HNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{H}_2\text{O} + \text{CO}_2$
9. $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
10. $2\text{K} + \text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + \text{H}_2$

Extension Task

Complete and balance the following equations:

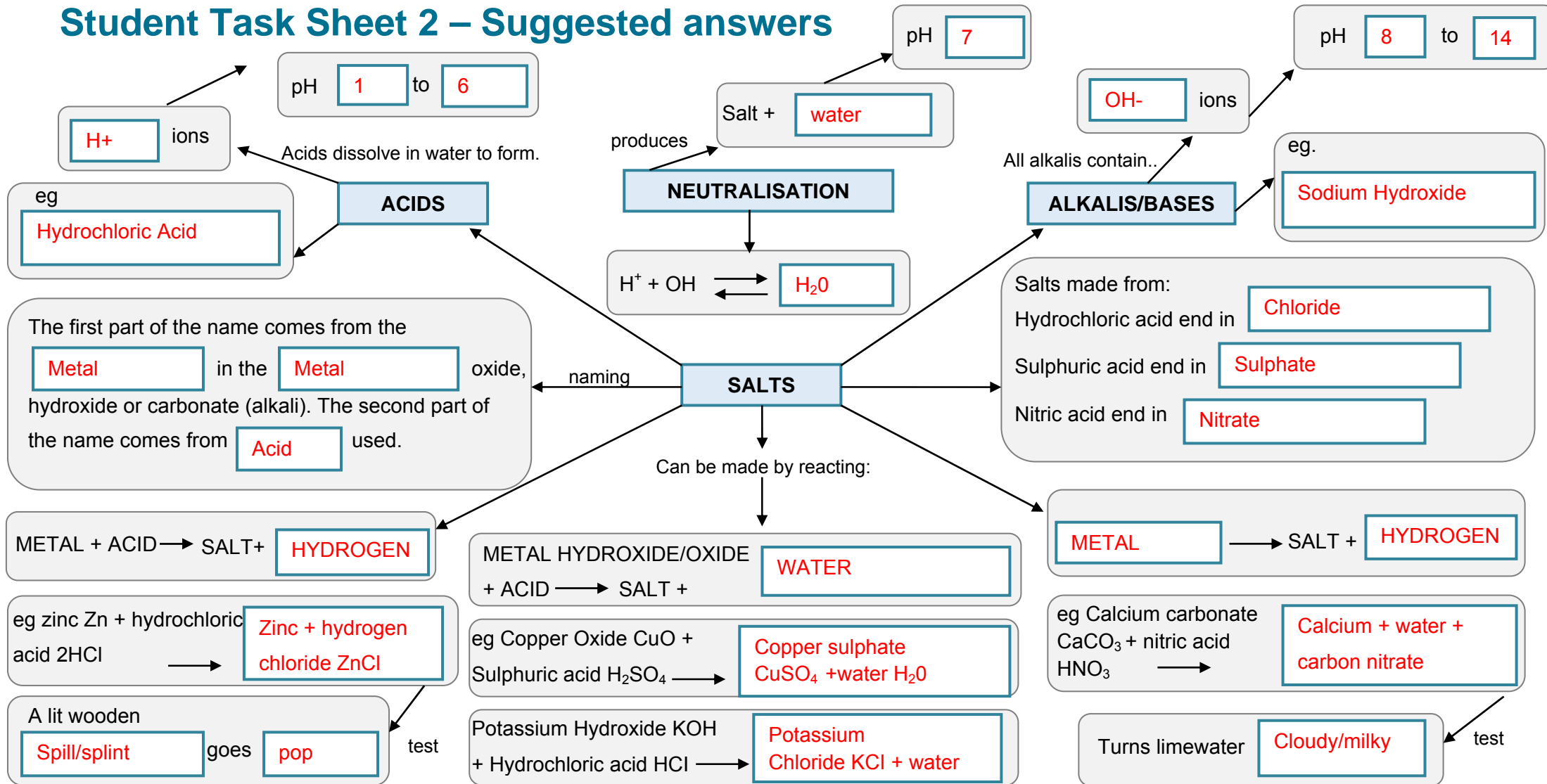
1. $2\text{Na} + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{H}_2$
2. $2\text{Al} + 3\text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + 3\text{H}_2$
3. $\text{ZnO} + 2\text{HNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{H}_2\text{O}$
4. $\text{Al}_2\text{O}_3 + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2\text{O}$
5. $\text{NH}_4\text{OH} + \text{HNO}_3 \rightarrow \text{NH}_4\text{NO}_3 + \text{H}_2\text{O}$
6. $\text{LiOH} + \text{HCl} \rightarrow \text{LiCl} + \text{H}_2\text{O}$
7. $\text{K}_2\text{CO}_3 + 2\text{HCl} \rightarrow 2\text{KCl} + \text{CO}_2 + \text{H}_2\text{O}$
8. $\text{Al}_2(\text{CO}_3)_3 + 6\text{HNO}_3 \rightarrow 2\text{Al}(\text{NO}_3)_3 + 3\text{CO}_2 + 3\text{H}_2\text{O}$

Activity 3: Mindmap

Apparatus: Learner Activity Sheet 2 – Mindmap

This is a salts mindmap that could be used by learners as a consolidation activity or to underpin research.

Student Task Sheet 2 – Suggested answers



Activity 4: SPLAT!

Apparatus: SPLAT! PowerPoint, SPLAT! Answer Sheet

Learners need to work in pairs during this consolidation activity. Each slide contains a number of formulae with different parts missing that will appear one at a time. Learners are to have 2 different coloured pens and compete with one another to circle the missing chemical. You can ask learners to volunteer ideas for the answer.

Supporting Information

The key areas to focus on when writing equations for making salts are:

1. Linking the name of the metal (in the oxide, hydroxide or carbonate) with the first part of the name of the salt. e.g. **calcium** carbonate → **calcium** salt.
2. Linking the second part of the name of the salt to the acid used.

Hydrochloric acid → **chloride**

Sulphuric acid → **sulphate**

Nitric acid → **nitrate**

(A simple way of introducing this to lower ability learners is to draw three columns on the board and write 'hydrochloric acid', sulphuric acid' and 'nitric' acid at the top of each column respectively. Give learners pieces of card with the name of a salt written on. Ask learners to look at the name written on their card and the three acids on the board and try to work out if they can see a link between their card and one of the acids. The learners then blu-tac the cards in the relevant columns. This can then be used by the teacher to explain how a salt is formed and named).

3. Learners may also get the other products of the reaction mixed up:

metal + acid → salt + **hydrogen**

metal **oxide/hydroxide** + acid → salt + **water**

metal **carbonate** + acid → salt + water + **carbon dioxide**

4. A salt is formed when the hydrogen of an acid is replaced by a metal (the hydrogen is displaced by the metal).

Supporting information

Useful websites to aid teaching 'making salts' are:

http://www.bbc.co.uk/bitesize/ks3/science/chemical_material_behaviour/acids_bases_metals/revision/7/

(this is useful for lower ability learners)

http://www.bbc.co.uk/schools/gcsebitesize/science/add_ocr_21c/chemical_synthesis/whychemicalsrev6.shtml

http://www.boroughmuir.edin.sch.uk/subjects/chemistry/s4_notes/acid_reactions.pps

(PowerPoint presentation)

To give us feedback on, or ideas about the OCR resources you have used, email resourcesfeedback@ocr.org.uk

OCR Resources: *the small print*

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