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Year 8 · KS3 Chemistry · GCSE foundations

Acids, Alkalis & Neutralisation

Homework Worksheet

Practise the pH scale, indicators, ions, naming salts and writing word equations for neutralisation reactions.



Name: _____ Class: _____

Date set: _____ Date due: _____

What's inside

Section A	Key words, definitions & state symbols	Q1–Q3 · 19 marks
Section B	The pH scale, litmus & universal indicator	Q4–Q7 · 19 marks
Section C	Ions, naming salts & neutralisation in real life	Q8–Q10 · 15 marks
Section D	Word equation practice (incl. metal carbonates)	Q11–Q13 · 20 marks
Challenge	Symbol equations & the ionic equation	Q14 · 4 marks

Instructions

- Answer **all** questions in the spaces provided.
- Use your class notes on acids, alkalis and the pH scale.
- Marks for each question are shown in [ ].
- Write word equations with an arrow (→), not an equals sign.

Total score

/ 77

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Section A — Key words & definitions

19 marks

1 Complete the sentences using words from the box. Each word can be used **once**. Two words are not needed. **[9]**

base · soluble · alkalis · hydrogen · hydroxide · neutral · indicator · salt · water · insoluble · oxygen

a) A _____ is any substance that reacts with an acid to form a salt and water only.

b) Bases that are _____ in water are called _____.

c) Acids produce _____ ions (H^+) when they dissolve in water.

d) Alkalis produce _____ ions (OH^-) when they dissolve in water.

e) A solution with a pH of 7 is _____ — it is neither acidic nor alkaline.

f) An _____ is a substance that changes colour to show if a solution is acidic or alkaline.

g) When an acid reacts with a base, a _____ and _____ are made.

2 **State symbols** tell us the physical state of each substance in an equation. Draw a line to match each state symbol to its meaning. **[4]**

(s)	gas
(l)	aqueous (dissolved in water)
(g)	solid
(aq)	liquid

2b Hydrochloric acid is written as $HCl_{(aq)}$. Explain what the **(aq)** tells you about the acid. **[1]**

.....

3 Tick (✓) **True** or **False** for each statement. **[5]**

	True	False
a) All alkalis are bases.	☐	☐
b) All bases are alkalis.	☐	☐
c) Sodium hydroxide (NaOH) is an example of an alkali.	☐	☐
d) A solution of pH 2 is more acidic than a solution of pH 5.	☐	☐
e) Acidic solutions have a pH greater than 7.	☐	☐

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Section B — The pH scale & indicators

19 marks

4 The pH scale runs from 0 to 14. **[4]**

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

a) Which pH number is **neutral**? _____

b) Give the range of pH values for an **acidic** solution. _____

c) Give the range of pH values for an **alkaline** solution. _____

d) As the pH goes **down** from 6 to 1, the solution becomes more _____.

5 Complete the table to show whether each substance is **acidic**, **neutral** or **alkaline**. **[7]**

Substance	pH	Acidic, neutral or alkaline?
Lemon juice	2	
Pure water	7	
Soap solution	10	
Vinegar	3	
Oven cleaner	13	
Stomach acid	1	
Baking soda solution	9	

5b Using the table above, name: **[2]**

i) the **strongest acid** _____ ii) the **strongest alkali** _____

6 **Litmus paper** is a simple pH indicator. **[3]**

a) What colour does litmus turn in an **acid**? _____

b) What colour does litmus turn in an **alkali**? _____

c) A student dips red litmus paper into a cleaning liquid and it turns blue. Is the liquid acidic or alkaline? _____

7 **Universal indicator** shows *how* acidic or alkaline a solution is. Use the key to give its colour in each liquid below. **[3]**

pH	0–2	3–4	5–6	7	8–10	11–14
Universal indicator colour	red	orange	yellow	green	blue	purple

a) Vinegar (pH 3) _____

b) Pure water (pH 7) _____

c) Oven cleaner (pH 13) _____

Section C — Ions, salts & neutralisation in real life

15 marks

8 When acids and alkalis dissolve in water, they split up into **ions**. Complete each equation. **[4]**

> **Example:** $HCl_{(aq)} \rightarrow H^+_{(aq)} + Cl^-_{(aq)}$

i) $HNO_{3(aq)} \rightarrow$ _____ + $NO_3^-{}_{(aq)}$

ii) $NaOH_{(aq)} \rightarrow Na^+_{(aq)}$ + _____

iii) $KOH_{(aq)} \rightarrow$ _____ + $OH^-_{(aq)}$

iv) $HBr_{(aq)} \rightarrow H^+_{(aq)}$ + _____

8b Name the ion that makes a solution: **[2]**

i) acidic _____ ii) alkaline _____

> **Naming salts — the rule**
> The **first** part of the salt's name comes from the **metal** in the base. The **second** part comes from the **acid**:
>
> hydro**chloric** acid → metal **chloride**
> **sulfuric** acid → metal **sulfate**
> **nitric** acid → metal **nitrate**
>
> e.g. **zinc** hydroxide + **hydrochloric** acid → **zinc chloride** + water

9 Name the **salt** made in each reaction. **[6]**

Base	Acid	Name of salt
sodium hydroxide	hydrochloric acid	
potassium hydroxide	nitric acid	
zinc hydroxide	sulfuric acid	
copper oxide	hydrochloric acid	
magnesium oxide	nitric acid	
calcium hydroxide	sulfuric acid	

10 Neutralisation in everyday life: **[3]**

a) A bee sting is **acidic**. Should you treat it with vinegar (pH 3) or baking soda solution (pH 9)? Explain why.

b) A farmer's soil is too acidic for crops. Suggest what type of substance the farmer could add to the soil.

Section D — Word equation practice

20 marks

acid + base → salt + water

11 Complete these word equations for **neutralisation** reactions. **[10]**

a) sodium hydroxide + hydrochloric acid → _____ + _____

b) potassium hydroxide + sulfuric acid → _____ + water

c) _____ + nitric acid → sodium nitrate + water

d) zinc hydroxide + _____ → zinc chloride + water

e) copper oxide + sulfuric acid → _____ + _____

f) lithium hydroxide + _____ → lithium sulfate + water

g) magnesium hydroxide + nitric acid → _____ + _____

12 Write the full **word equation** for each reaction. **[6]**

a) Calcium hydroxide reacts with hydrochloric acid.

b) A student adds sulfuric acid to magnesium oxide powder.

c) Antacid tablets contain magnesium hydroxide, which neutralises hydrochloric acid in the stomach.

13 **Acids also react with metal carbonates.** This makes a salt, water *and* carbon dioxide gas (you would see fizzing). **[4]**

acid + metal carbonate → salt + water + carbon dioxide

a) calcium carbonate + hydrochloric acid → calcium chloride + _____ + _____

b) sodium carbonate + sulfuric acid → _____ + water + _____

14 **Challenge ★** Look at this symbol equation: $Zn(OH)_2 + 2HCl \rightarrow ZnCl_2 + 2H_2O$ **[4]**

a) Which substance is the **base**? _____ Which is the **salt**? _____

b) Complete the symbol equation: $NaOH + HCl \rightarrow$ _____ $+ H_2O$

c) In every neutralisation, H^+ ions from the acid join with OH^- ions from the base. Complete: $H^+_{(aq)} + OH^-_{(aq)} \rightarrow$ _____$_{(l)}$