Name & Surname: _____	Class: _____	Date: _____

Acids and Alkalis

Measuring pH and neutralising safely

About 35 minutes Level ★★★☆☆



Acids, alkalis and neutralisation

An **acid** has a **pH** below 7, and an **alkali** has a pH above 7. An alkali is a soluble base that can neutralise an acid.

- **Neutral** solutions have a pH of 7, such as pure water.
- When an **acid** and an alkali mix in the right amounts, **neutralisation** happens to make a salt and water.
- **Indicators** change **colour** in acids and alkalis, for example litmus and universal indicator.
- Word equation: sodium hydroxide + hydrochloric **acid** -> sodium chloride + water.

Task A

/6

Choose the best indicator for each person and explain your choice.

red or blue litmus paper | universal indicator paper | red cabbage indicator

Person	Most suitable choice	Justification
a student who only needs to know if a liquid is an acid or an alkali		....
a student who needs the exact pH number from acidic to alkaline		....
a student doing a food-safe test at home with no lab chemicals		....

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What Do You Know?

Think about acids and alkalis in everyday life.

Task B

Complete what you know and want to know about acids and alkalis.

Think about: What liquids at home do you think are acidic? · Why might it be useful to neutralise an unwanted acid or alkali?

K What I know	W What I want to know	L What I learnt

Key words

acid: a solution with pH below 7

alkali: a soluble base with pH above 7

pH scale: a scale from acidic to alkaline, with 7 neutral

indicator: a dye that changes colour in acid or alkali

neutralisation: acid plus alkali reacting to make salt and water

corrosive: can attack skin, metal or stone

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Test With Indicators

Read indicator colours to find pH.

Task C

/4

Explain which indicator is better for measuring pH.

Why is universal indicator more useful than litmus paper for finding the exact pH?

P **Point**
I think that universal indicator is more useful because …

E **Evidence**
For example, litmus only … while universal indicator …

E **Explain**
This shows that universal indicator …

L **Link**
Therefore, for measuring pH …

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Numbers Around Neutral

Use pH numbers and volumes to compare solutions.

◎ Task D

/6

Use pH numbers to work out differences and volumes.

1. Pure water has a **pH** of 7. Lemon juice has a pH of 2. How many pH units lower is lemon juice?

Working

Answer

_____ **pH units**

2. An oven cleaner has a **pH** of 13. Pure water has a pH of 7. How many pH units higher is the oven cleaner?

Working

Answer

_____ **pH units**

3. A student neutralises 15 mL of dilute **acid** with 15 mL of dilute alkali. What is the total **volume** of the mixture?

Working

Answer

_____ **mL**

Task E

Show what you know about the pH scale.

Draw a labelled pH scale from 1 to 14 to show acidic, neutral and alkaline colours and write two sentences about it

Draw here

Write here

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Neutralisation In Action

Apply acids, indicators and neutralisation to real life.

Task F

/3

Apply neutralisation to a real-life problem.

A student spills some dilute hydrochloric **acid** on a bench. The teacher adds a dilute **alkali** a little at a time to neutralise it. The student stirs and tests drops with universal **indicator** until it stays green.

1. **What colour should the universal indicator turn when the mixture is neutral?**
   It should turn...

2. **What products are made during this neutralisation?**
   The products are...

3. **Why is it important to check the pH before wiping up the spill?**
   It is important because...

Task G

/2

Spot the mistakes about acids and indicators.



Student A

All **acids** are dangerous and all cleaning products are acids.

What mistake did Student A make? Write the correct fact.



Student B

Litmus paper gives you the exact **pH** number and red cabbage cannot be an indicator.

What mistake did Student B make? Write the correct fact.

How did I do?

Circle a face for each line.

I can describe acids and alkalis using the pH scale	☹	😐	☺
I can choose an indicator and read its colour change	☹	😐	☺
I can describe neutralisation as acid plus alkali making salt and water	☹	😐	☺

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Answer sheet: Acids and Alkalis

Task A

a student who only needs to know if a liquid is an acid or an alkali: red or blue litmus paper (Litmus turns red in acid and blue in alkali, so it shows acid or alkali quickly, but not the exact pH.)

a student who needs the exact pH number from acidic to alkaline: universal indicator paper (Universal indicator gives a different colour for each pH, with green for pH 7 neutral, red for strongly acidic and dark purple for strongly alkaline.)

a student doing a food-safe test at home with no lab chemicals: red cabbage indicator (Red cabbage is a natural indicator that changes colour in acids and alkalis and is safe to use with foods like lemon juice.)

Task B

Answers will vary.

Task C

Example: Universal indicator is more useful because it shows strength as well as type. For example, litmus only turns red in acid and blue in alkali, while universal indicator turns red for strongly acidic, green for pH 7 neutral and dark purple for strongly alkaline. This shows that universal indicator gives the pH value, not just acid or alkali. Therefore, for measuring pH, universal indicator is the better choice.

Task D

1. 5 pH units (7 - 2 = 5)
2. 6 pH units (13 - 7 = 6)
3. 30 mL (15 + 15 = 30)

Task E

Answers will vary.

Task F

1. Green, because green means neutral at pH 7.
2. A salt and water are made, for example sodium chloride and water when sodium hydroxide neutralises hydrochloric acid.
3. To make sure the acid has been fully neutralised to pH 7 so it will not corrode skin or damage surfaces.

Task G

1. Student A: Wrong. Some acids are weak and safe in foods, like citric acid in lemon juice. Many cleaning products are alkalis, like oven cleaner, soap and toothpaste.
2. Student B: Wrong. Litmus only turns red in acid and blue in alkali. Universal indicator gives the exact pH, and red cabbage is a natural indicator that changes colour in acids and alkalis.

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