

## Science Worksheet

**Investigate Acids and Alkalis**

In this worksheet, students will learn about acids and alkalis and how they react together in neutralisation reactions to form a salt and water.

**Key Information**

<b>Topic</b>	Chemical Reactions
<b>Level (1-3)</b>	● ○ ○
<b>Questions</b>	10
<b>Key Stage</b>	KS 3
<b>Year</b>	7
<b>Curriculum Coverage</b>	Chemistry: Chemical Reactions
<b>Curriculum Skill</b>	Acids and Alkalis: Neutralisation Reactions

Name Date

## Introduction

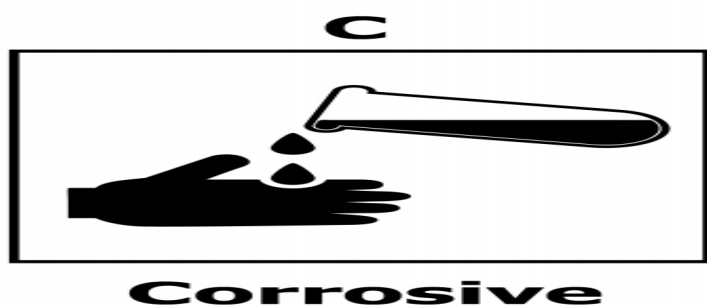
**Acids** and **alkalis** can be found in a chemistry laboratory, but also in our houses! **Acids** are substances with a tangy taste... that's right, like lemons. Fruit like lemons and oranges contain citric acid, which gives them that sharp, sour taste. They also contain ascorbic acid, which is Vitamin C.



As you can see, acids are useful, good for you and tasty! Well, maybe not in the case of vinegar.

However, not all acids can be eaten; some are very harmful and can **corrode** your skin, whereas weaker ones are **irritants**, which means they will give you a rash if they come into contact with your skin.

Here is the hazard symbol for strong corrosive acids.



**Corrosive**

At school, you're likely to use the following dilute acids: hydrochloric acid, sulfuric acid and nitric acid. All acids contain hydrogen.

**Alkalis** can also be found in the laboratory or in our households. The most

common laboratory alkali is sodium hydroxide.

Alkalis, generally, feel a bit like soap. Actually, they were used as cleaning products by ancient Arabs. They were made with ash and animal fat. Today, most cleaning products are alkalis, for example, toothpaste, soap and oven cleaners.

In a way, alkalis are the opposite of acids. There can be weak alkalis and strong alkalis, which are **caustic**, like caustic soda. Caustic substances can burn our skin.

There is a way to identify whether a substance is an acid or an alkali. It is called the **litmus test**. A special paper called litmus paper is dipped into the substance.

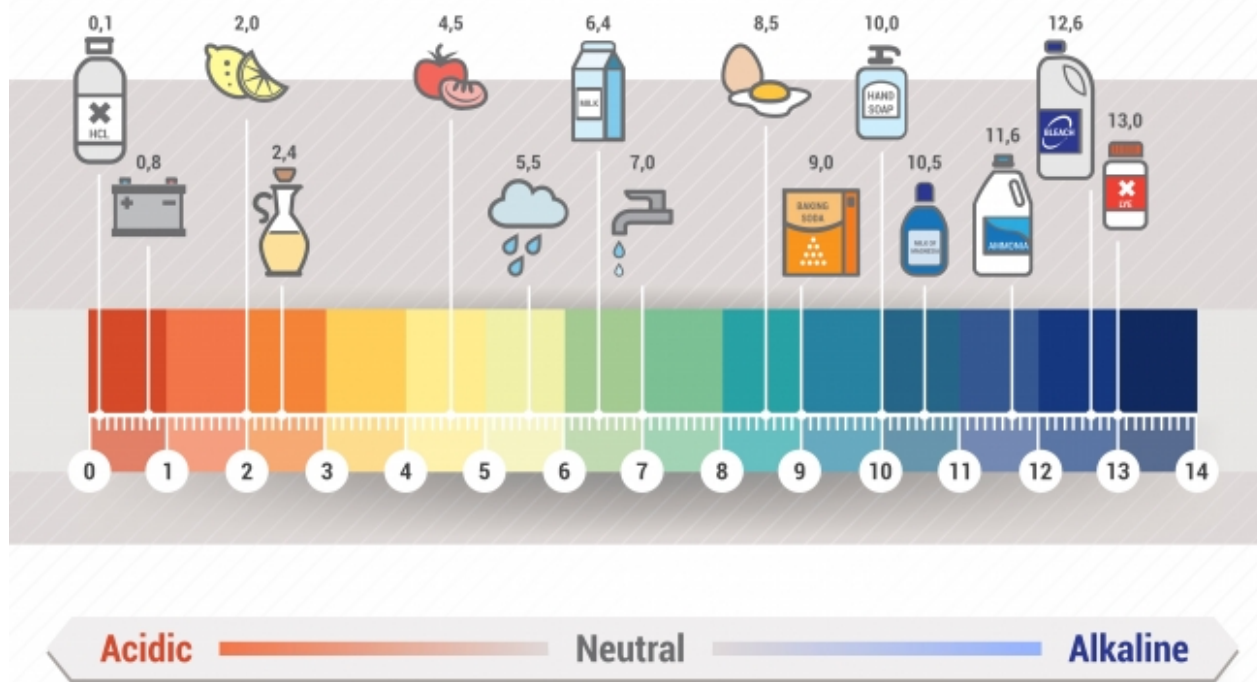
There is red litmus paper and blue litmus paper.

No matter what the initial colour is, **acids** will turn litmus paper **red** and **alkalis** will turn litmus paper **blue**.

A **neutral** substance, one which is neither an acid nor an alkali, will turn litmus paper **purple**.

There is another test, which can also tell us how acidic or alkaline a substance is - this is the **pH test**. You can see the pH scale below, which runs from pH0 (very acidic) to pH14 (very alkaline).

## The PH Scale



There is a special solution called Universal Indicator solution. When a few drops of Universal Indicator are added to a substance, it turns a different colour. This colour matches one of the colours on the Universal Indicator scale above and that's how you determine how acidic or alkaline a substance is and so what its pH is.

Acids and alkalis react together in a reaction called **neutralisation**. The products of neutralisation are always water and a **salt**. Beware: even though common salt, the one we add in our food, can be one of those salts, there are many others and their type depends on the specific acid or alkali that reacts. Salts and water are neutral substances.

This is the general neutralisation reaction:

acid + alkali ? salt + water

## QUESTIONS

## Question 1

How do acids taste?

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- Answer 1            Sweet
- Answer 2            Bitter
- Answer 3            Sour
- Answer 4            Savoury

## Question 2

What is the scientific name for vitamin C?

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- Answer 1            Citric acid
- Answer 2            Ascorbic acid
- Answer 3            Ethanoic acid

## Question 3

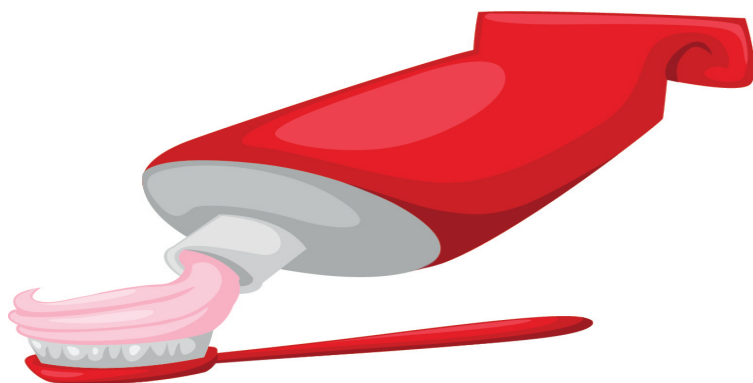
Tick **three** acids we can eat or drink from the list below.



- Answer 1  Hydrochloric acid
- Answer 2  Orange juice
- Answer 3  vinegar
- Answer 4  Sulfuric acid
- Answer 5  Lemonade

#### Question 4

Tick **three** alkalis we use at home from the list below.



- Answer 1  Toothpaste
- Answer 2  Sink cleaner

Answer 3            Sodium hydroxide

Answer 4            Oven cleaner

Answer 5            Water

### Question 5

Complete this sentence:

*Strong acids can be* \_\_\_\_\_.

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Answer 1            corrosive

Answer 2            caustic

### Question 6

Complete this sentence:

*Strong alkalis can be* \_\_\_\_\_.

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Answer1     

### Question 7

Lime juice turns blue litmus paper red.

**Is lime juice an acid or an alkali?**



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- Answer 1            Acid
- Answer 2            Alkali

### Question 8

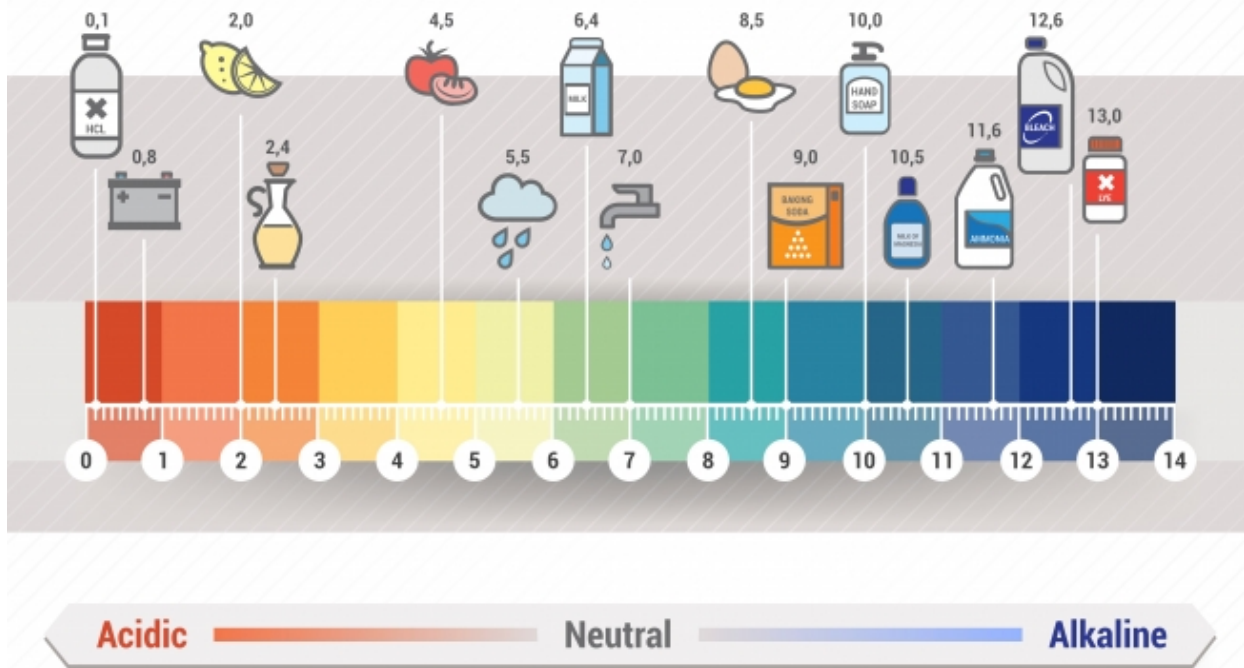
This is the pH scale that you came across in the introduction of this activity.

A neutral substance turns green when Universal Indicator solution is added.

**What is the pH of the substance?**

*Find green in the scale and check what number it corresponds to.*

## The PH Scale



- Answer 1  6
- Answer 2  7
- Answer 3  8

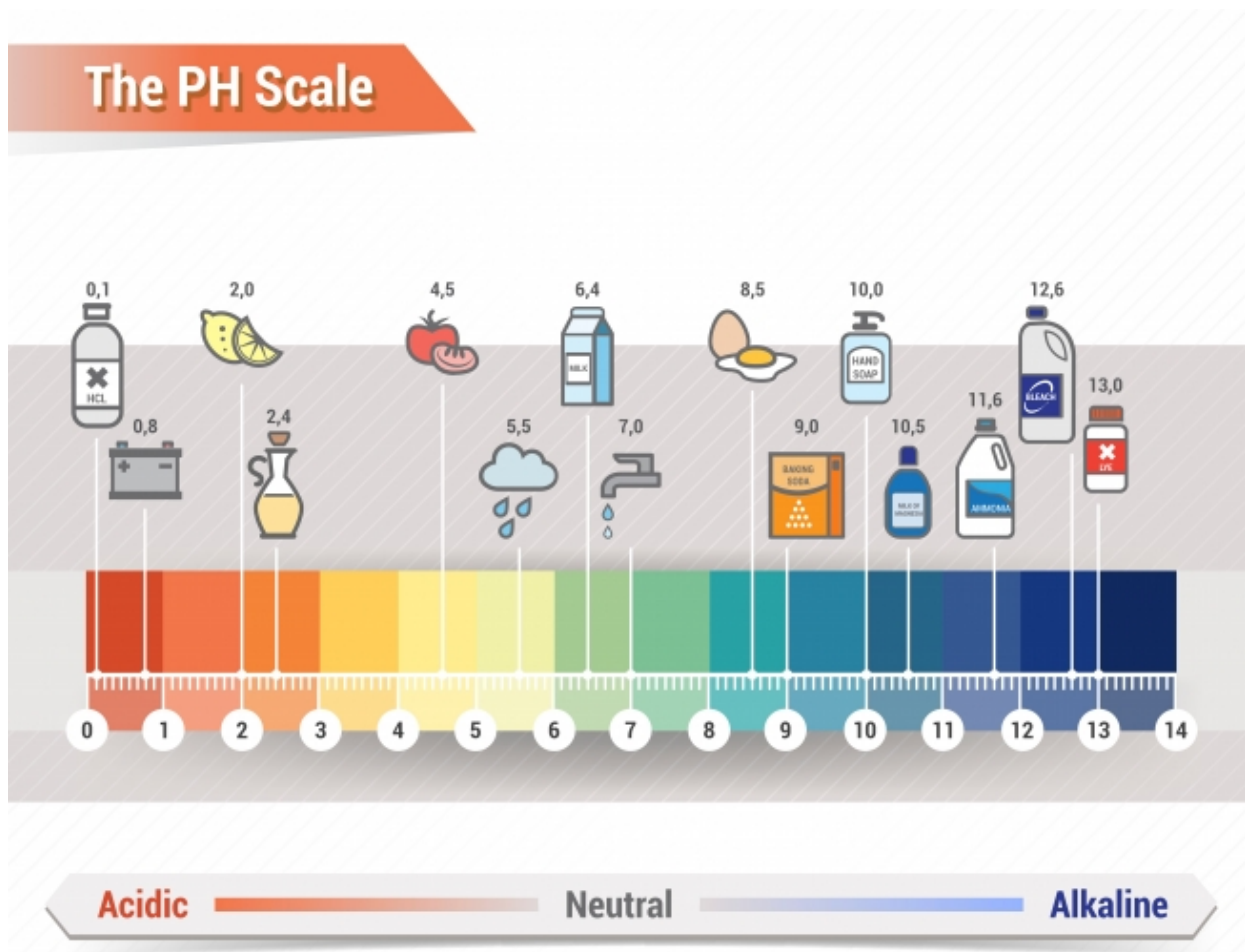
### Question 9

This is the pH scale that you came across in the introduction of this activity.

An alkaline substance turns dark blue when Universal Indicator solution is added.

**What is the pH of the substance?**

Find dark blue in the scale and check what number it corresponds to.



- Answer 1        1
- Answer 2        7
- Answer 3        14

**Question 10**

Acids and alkalis react together to produce neutral substances.

**What is this type of reaction called?**

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Answer1

**ANSWERS****Answer 1****Correct Answers**

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Answer 1          Sour**Answers Explanation**

Acids taste tangy, or sour, like lemons. However, it's never a good idea to test if something is acidic by tasting it - some of them can be very dangerous!

**Answer 2****Correct Answers**

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Answer 1          Ascorbic acid**Answers Explanation**

Did you remember this from the introduction? Vitamin C is called ascorbic acid.

**Answer 3****Correct Answers**

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- Answer 1          Orange juice  
Answer 2          vinegar  
Answer 3          Lemonade

### Answers Explanation

Orange juice, vinegar and lemonade can be consumed as drinks or in food. The other two acids are only used in the laboratory and would be very dangerous if they touched your skin, let alone if you swallowed them!

### Answer 4

#### Correct Answers

- Answer 1  Toothpaste  
Answer 2  Sink cleaner  
Answer 3  Oven cleaner

### Answers Explanation

Toothpaste, sink cleaner and oven cleaners are alkalis used at home for cleaning purposes. Sodium hydroxide is only used in the laboratory, whereas water is a neutral substance.

### Answer 5

#### Correct Answers

- Answer 1  corrosive

### Answers Explanation

Strong acids are corrosive. This means that if the acid was to come into contact with your skin or eyes, for example, it could cause damage.

### Answer 6

**Correct Answers**

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Answer 1 **Answers Explanation**

Strong alkalis are caustic. Caustic means that the alkali could burn living tissue like your skin.

**Answer 7****Correct Answers**

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Answer 1  Acid**Answers Explanation**

Lime juice is an acid and, like all acids, turns litmus paper red.

**Answer 8****Correct Answers**

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Answer 1  7**Answers Explanation**

Neutral substances turn Universal Indicator green, so their pH is 7. Water is the most obvious example of a neutral substance.

## Answer 9

**Correct Answers**Answer 1  14**Answers Explanation**

Alkaline substances turn Universal Indicator dark shades of blue-green, purple and blue. For dark blue you have to go to the far right end of the pH scale. The pH is 14. Last question coming up!

## Answer 10

**Correct Answers**Answer 1 Answer 2 **Answers Explanation**

Acids and alkalis react together and the reaction is called neutralisation, because neutral substances are produced. These are a metal salt plus water, e.g. zinc sulfate + water. Remember: Acid + Alkali ? Salt + Water  
This was quite a challenging activity, so well done for completing it!

Total score: 