

WEEK: 15

Week Beginning: (29/06/20)

Subject: **SCIENCE**

Year: 7

Lesson Objective:

- Acids and alkalis.
- Neutralisation reactions.

Keywords/ Concepts

- Acid
- Alkali
- pH
- Neutralisation

Class Questions

Homework

- **Worksheets.**

Additional Notes

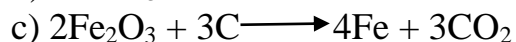
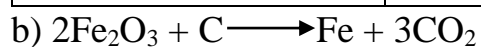
- **Answers to homework week 14 can be found below.**

Week 14 homework answers (Balancing Equations)

- 1 carbon (C), 2 oxygen (O)
 - 1 copper (Cu), 1 sulfur (S), 4 oxygen (O)
 - 1 sodium (Na), 1 chlorine (Cl)
 - 2 iron (Fe), 3 oxygen (O)
 - 1 nitrogen (N), 3 hydrogen (H)
 - 2 hydrogen (H), 1 oxygen (O)
 - 1 copper (Cu), 1 oxygen (O)
- aluminium oxide
 - magnesium oxide
 - sodium chloride
- How many of each chemical react or are made in a reaction.
 - calcium + oxygen \longrightarrow calcium oxide
 - Ca (calcium), O₂ (oxygen)
 - $2\text{Ca} + \text{O}_2 \longrightarrow 2\text{CaO}$
- S + O₂ \longrightarrow SO₂ and AgCO₃ \longrightarrow AgO + CO₂ are balanced and the other two are unbalanced.

5. a)

<u>Element</u>	<u>Left side</u>	<u>Right side</u>
Fe	2	1
O	3	2
C	1	1



Classwork

Acids and Alkalis

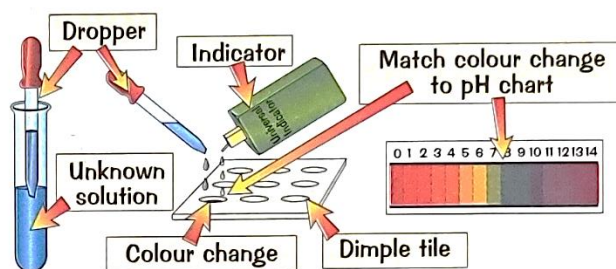
The **pH scale** is what scientists use to describe how **acidic** or **alkaline** a substance is.

The pH Scale Shows the Strength of Acids and Alkalis

- 1) The **pH scale** goes from **0** to **14**.
- 2) Anything with a pH **below 7** is an **acid**. The **strongest** acid has **pH 0**.
- 3) Anything with a pH **above 7** is an **alkali**. The **strongest** alkali has **pH 14**.
- 4) A **neutral** substance has **pH 7** (like water).

Indicators Are Dyes Which Change Colour

- 1) An indicator is something that **changes colour** depending on whether it's in an **acid** or in an **alkali**.
- 2) **Litmus paper** is an indicator. **Acids** turn litmus paper **red**. **Alkalis** turn it **blue**.
- 3) **Universal indicator** solution is a liquid indicator.
- 4) It gives the **colours** shown in a **pH chart**.

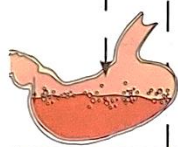


A pH Chart Shows How Strong an Acid or Alkali is

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



Strong ACIDS Weak ACIDS Weak ALKALIS Strong ALKALIS



Hydrochloric (Stomach) Acid



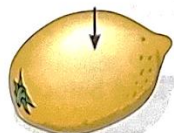
Rain Water



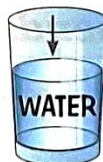
Washing Up Liquid



Sodium Hydroxide (Oven Cleaner)



Citric Acid (Lemon Juice)



WATER



Soap Flakes

Neutralisation Reactions

You might have done something like this in the lab. If not, I bet you will pretty soon.

Acids and Alkalis Neutralise Each Other

- 1) Acids react with alkalis to form a salt and water:

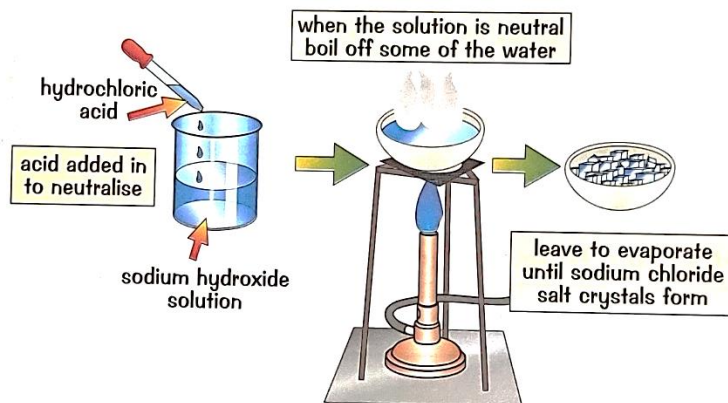


You can get different kinds of salt — not just table salt.

- 2) This is a neutralisation reaction. The products have a neutral pH (a pH of 7).

Making Salts by Neutralisation

Making salts is pretty easy — you just need a steady hand and a lot of time. A bit like whisking eggs.



- 1) Wearing eye protection, add an acid to an alkali. Stop when the solution is neutral.
- 2) Boil off some of the liquid so you're left with a really concentrated solution.
- 3) Leave the solution overnight for the rest of the water to evaporate. Nice big salt crystals will form.
- 4) The reaction between hydrochloric acid and sodium hydroxide makes the salt sodium chloride:



The Name of the Salt Depends on the Acid

- 1) Hydrochloric acid always reacts to make a salt with chloride in the name.
For example, sodium chloride.
- 2) Sulfuric acid always reacts to make a salt with sulfate in the name.
For example, copper sulfate.

Acids and Alkalis

Q1

For each item, decide whether it's an acid, alkali, or if it's neutral. Write your answer in the box underneath each picture.



Apple



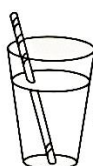
Orange



Lemonade



Bleach



Water



Washing Powder

Q2

Write the following labels on the pH scale shown below:
i) Strong Acid, ii) Weak acid, iii) Neutral, iv) Strong alkali, v) Weak alkali.

pH Scale

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

Q3

Complete the table below, filling in the gaps with the words given.

pH8 yellow pH1 red weak acid pH13 strong alkali
 weak alkali strong acid purple blue green pH6 pH7 neutral

Useful Substance	pH value	Colour with Universal Indicator	Acid, Alkaline or Neutral
a) Hydrochloric acid in stomach			
b) Rain water			
c) Sodium hydroxide			
d) Tap water			
e) Washing up liquid			

Acids and Alkalis

Q4

Jasmine has a sample of nitric acid and a sample of sodium hydroxide. She adds some **universal indicator** to each sample to find out their pH.

- a) i) Name **one** other indicator that changes colour in an acid and an alkaline solution.

.....
 ii) What colour does this indicator turn in an acidic solution?

.....
 iii) What colour does this indicator turn in an alkali solution?

- b) Why is universal indicator the best indicator for Jasmine to use in this experiment?

.....

Q5

Bob and Linda are trying to make a salt. They have a bottle of **acid** and a bottle of **alkali** which when reacted together will make a salt and water.

- a) They want to test the pH of the acid and alkali before they mix them together. Bob suggests that they add a few drops of universal indicator to **each bottle** to test their pH.

Describe a better way of testing the pH of the acid and alkali.



.....

- b) Bob and Linda react some of the acid and alkali together and test the pH of the solution made using universal indicator. The indicator turns yellow.

i) Is the solution acidic, neutral or alkaline?

.....
 ii) What colour will the indicator turn when the right amounts of acid and alkali have been combined to make a solution of salt and water?

.....

Neutralisation Reactions

Q1 Acid and alkali combined will give a salt and water, if they are mixed in the right amounts.

a) What is the name given to this type of reaction?

.....

b) What is the pH of the resulting solution of salt and water?

.....

c) Put the correct acid into each equation. Some acids may be used more than once.

Nitric acid produces nitrate salts.

Sulfuric acid produces sulfate salts.

Hydrochloric acid produces chloride salts.

i) Sodium hydroxide + → Sodium sulfate + water

ii) Sodium hydroxide + → Sodium nitrate + water

iii) Calcium hydroxide + → Calcium chloride + water

iv) Calcium hydroxide + → Calcium sulfate + water

Q2 Fill the blanks using the words below.

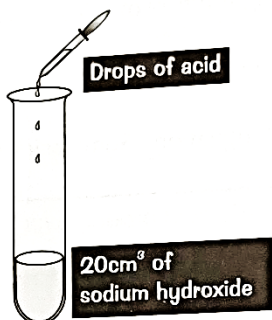
alkali	neutralisation	acid	green	water	nitrate
universal indicator	indicator	indicator	sulfuric acid	chloride	chloride
Salts are prepared by the of an and an This also gives					
To make sure the acid and alkali are added in the right amounts an is used to test the solution. is a good indicator to use. It goes in a neutral solution. The type of acid used will give a particular salt. For example will give a sulfate, hydrochloric acid will give a and nitric acid will give a All these are types of salts.					

Neutralisation Reactions

Q3

You can make a salt solution by neutralising sodium hydroxide with hydrochloric acid, as shown.

1. A few drops of hydrochloric acid is added to a test tube containing 20cm^3 of sodium hydroxide.



2. A small sample of the solution in the test tube is removed and checked to see if the pH is neutral.
3. Repeat this process until you have a neutral solution.

a) Why do you keep checking to see if the pH is neutral?

.....
.....

b) Name an indicator that would be suitable to use.

.....
.....

c) Why do you not add the indicator to the test tube at the beginning, instead of taking samples of the mixture out?

.....
.....

d) Acids and alkalis are dangerous substances. Suggest **one** safety precaution you should take when doing this experiment.

.....

e) Give the chemical name of the salt formed in this experiment.

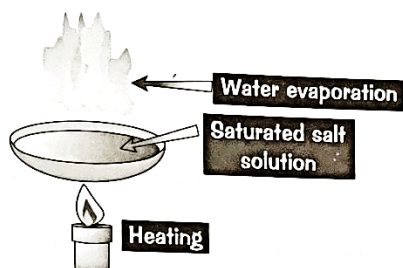
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Neutralisation Reactions

Q4 Brenda makes a neutral salt solution by reacting hydrochloric acid with potassium hydroxide.

a) Name the salt in the salt solution.

b) Brenda wants to use the solution to produce salt crystals. She pours the salt solution into a heat-proof dish and heats it using a Bunsen burner. She heats the solution until half the original amount of the solution is left in the dish. This solution is a saturated salt solution.



i) Describe what happens to the solution while it is being heated.

.....

.....

.....

ii) What is a **saturated** salt solution?

.....

.....

c) Brenda leaves the dish containing the saturated salt solution to cool on a window sill. She comes back after a day and the dish is filled with large salt crystals.

i) Complete these sentences.

The faster the cooling of the solution, the the crystals.

The slower the cooling of the solution, the the crystals.

ii) Describe one way Brenda could change her experiment to produce **smaller** salt crystals from the solution.

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