

EduTrend Contents

W4C · CHEMISTRY · PRIMARY

Balloon Gas Factory

Can a reaction blow up a balloon?

Ages 8–11 | Level: Developing | 60 minutes | Groups of 3 · up to 30 | Activity 02

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 pupil worksheets · assessment checklist

ACTIVITY 02 · AT A GLANCE

Balloon Gas Factory

Pupils discover that mixing two substances can make a new substance, a gas. They inflate a balloon using bicarbonate of soda and vinegar, then plan a fair test to find out how the amount of bicarbonate affects the size of the balloon. The activity introduces reversible and irreversible changes, measurement and fair testing.

Learning outcomes

By the end of the session pupils can:

- recognise that a chemical reaction makes new substances;
- identify signs of a reaction: bubbles, gas and temperature change;
- change one variable and measure its effect;
- present results in a table and a simple bar chart.

KEY WORDS

reaction · gas · carbon dioxide · irreversible · variable · measure · circumference

CURRICULUM LINKS

Science: changes of materials, irreversible changes. Maths: measuring in centimetres, bar charts. Design & technology: evaluating a design.

1	2	3	4	5	6
QUESTION	**PREDICT**	**PLAN**	**TEST**	**OBSERVE**	**EXPLAIN**
What do we want to know?	What will happen?	Keep it fair	Try it safely	Record results	Why did it happen?

Materials (per group)

- 3 small plastic bottles (500 ml)
- 3 balloons (latex-free if needed)
- Bicarbonate of soda, teaspoon and a small funnel
- Vinegar, 100 ml per bottle, and a measuring jug
- String and a ruler to measure balloon size
- Tray and paper towels
- Worksheets 1, 2 and 3

Before the session

- Stretch balloons in advance so they inflate easily.
- Measure vinegar into jugs for each group.
- Label bottles A, B and C.
- Cover tables and set out trays.
- Do a trial run with 2 teaspoons of bicarbonate.

SAFETY

Goggles on. Point bottles away from faces. Do not taste. Use latex-free balloons for pupils with allergies. Wipe spills and wash hands.

ACTIVITY 02 · SESSION PLAN

Step by step

Timings are for 60 minutes. If time is short, do the class test with one amount and complete the investigation in a second session.

Time	What happens	Say or ask
0–5 min **Hook**	Show a balloon on a bottle inflating by itself. Ask pupils what could be inside the balloon.	*"Where did the gas come from?"*
5–15 min **Explore**	Groups mix a spoon of bicarbonate with a little vinegar in a cup and observe closely: sound, bubbles, temperature.	*"What signs tell you something new is being made?"*
15–25 min **Plan**	Groups decide how much bicarbonate to use in bottles A, B and C (1, 2 and 3 teaspoons). They list what they will keep the same.	*"What will you change? What will you keep the same?"*
25–40 min **Test**	Using the funnel, groups put bicarbonate into the balloon, stretch it over the bottle neck and tip it in. After one minute they measure the balloon's circumference with string.	*"How can we measure the balloon fairly?"*
40–50 min **Analyse**	Groups draw a bar chart and compare with others.	*"What pattern do you see? Is there a limit?"*
50–60 min **Explain**	Discuss the gas (carbon dioxide) and why the change cannot be reversed. Worksheet 3.	*"Can we turn the gas back into bicarbonate and vinegar?"*

CHALLENGE CARD (print or copy onto the board)

Find the smallest amount of bicarbonate that inflates your balloon to a circumference of 40 cm. Explain how you decided.

ACTIVITY 02 · FACILITATOR NOTES

The chemistry in brief

Bicarbonate of soda (sodium hydrogencarbonate) reacts with the acid in vinegar (ethanoic acid). The reaction makes three new substances: carbon dioxide gas, water and sodium ethanoate, which stays dissolved. The carbon dioxide takes up much more space than the solids and liquids it came from, so it fills the balloon. The mixture also cools slightly, another sign of a chemical reaction.

The change is irreversible: we cannot easily get the bicarbonate and vinegar back. More bicarbonate makes more gas until the vinegar is used up. After that, adding more powder makes no difference, because one reactant has run out. Bakers use the same reaction when bicarbonate makes cakes rise.

Common ideas to listen for

- “The gas is air.” It is carbon dioxide, a new substance made by the reaction.
- “The bubbles are the vinegar boiling.” The mixture actually gets colder.
- “More powder always means more gas.” Once the vinegar runs out, extra powder does nothing.

Adapting the activity

Support

Give pupils pre-measured bags of bicarbonate and a string already marked in 5 cm steps.

Stretch

Test 4 and 5 teaspoons and find the point where the balloon stops getting bigger. Explain why.

WORKSHEET 1

Signs of a reaction

Name: _____ Class: _____ Date: _____

Mix a little bicarbonate and vinegar in a cup. Use your senses (not taste) to observe.

What I noticed

Sense	What I noticed
See	
Hear	
Touch the outside of the cup	

Is a new substance made? How do you know?

WORKSHEET 2

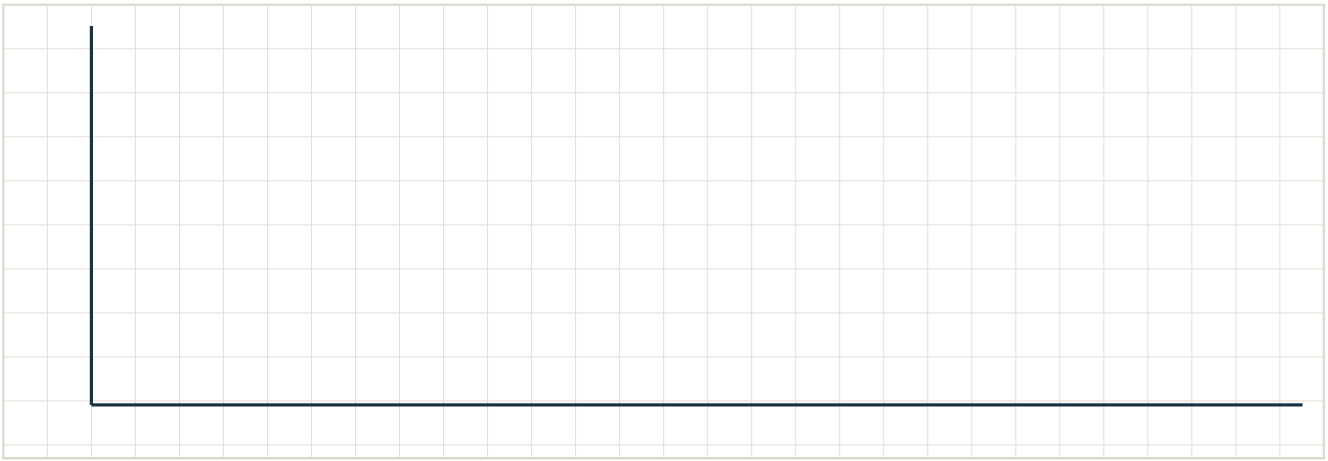
Our investigation

Change the amount of bicarbonate. Keep everything else the same.

Results

Bottle	Teaspoons	Balloon circumference (cm)
A		
B		
C		

Bar chart



y-axis: circumference (cm)

x-axis: teaspoons of bicarbonate

Pattern

When we used more bicarbonate, the balloon

WORKSHEET 3

Scientist's log

Colour in the box that is true for you.

What I can do

I can...	Not yet	Nearly	Yes!
name signs of a reaction			
explain where the gas came from			
change one thing and keep others the same			
read my bar chart			

Is this change reversible? Why?

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight pupils; copy as needed.

Pupil	Identifies signs of reaction	Plans a fair test	Explains the pattern

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

Balloon Gas Factory is a sample activity from the EduTrend Contents W4C Chemistry programme (primary, level: developing). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

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