

## Organising elements

### Learning objectives

- 1 Explore the properties of common elements, commenting on similarities and differences.
- 2 Consider how common elements might be grouped, based on their properties.
- 3 Use given information to construct a simple table of elements.
- 4 Reflect on the arrangement of the periodic table and how this supports chemists to make predictions about elements.

### Introduction

The periodic table is an invaluable resource for chemists – it helps them to understand how and why elements behave the way they do and make predictions about how they'll react. It's particularly useful because, as well as listing all the known elements, it arranges them in a way that gives us further hints about what they're like. We are lucky that the arrangement of the modern periodic table has already been done for us, but this was not straightforward and took years to develop. In this task, you'll construct your own table of elements. But don't worry – it won't take you years to complete! To make the task simpler, you'll be using a limited number of elements but you'll be following similar thought processes to the original developers of the periodic table we use today.

### Instructions

Your teacher will show you a set of nine elements. The names and symbols of the elements are unknown, so they have been labelled with letters **A–I**.

Through a series of sorting activities, group the elements together according to their similarities until you can finally suggest an identity for each letter.

Then, construct your own table of elements, compare it to the modern periodic table and consider how and why it's arranged as it is.

## Element sorting activities

- Sort the letters into two groups using their descriptions and explain what each group has in common.

	Group 1	Group 2
List of elements	<p>— —</p> <p>— —</p> <p>— —</p>	<p>— —</p> <p>— —</p> <p>— —</p>
Explanation for grouping them together	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

- Identify an element that is very similar to element **G** using the descriptions above, then choose an element that is very different to **G**. Explain why you have chosen each element.

(a) Similar to G: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(b) Very different to G: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. Suggest how you might split these elements into three groups that contain either **C**, **D**, or **G** using the table below. Justify why you have grouped particular elements together by referring to their descriptions.

	Group 1	Group 2	Group 3
Element 1	Element: <b>C</b>	Element: <b>D</b>	Element: <b>G</b>
Element 2	Element: ____	Element: ____	Element: ____
Element 3	Element: ____	Element: ____	Element: ____
Reasons for putting these elements together	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____

4. These are the relative masses of the elements.

Element	A	B	C	D	E	F	G	H	I
Relative mass	80	24	35.5	40	23	88	39	127	85.5

Arrange the elements so that they maintain their groupings from question 3 but the masses increase through the table (left to right and top to bottom). You may need to change the column that the group appears in.

Arrange your elements in the table below.

Group 1	Group 2	Group 3
Element: _____ Mass: _____ (Element with least mass)	Element: _____ Mass: _____	Element: _____ Mass: _____
Element: _____ Mass: _____	Element: _____ Mass: _____	Element: _____ Mass: _____
Element: _____ Mass: _____	Element: _____ Mass: _____	Element: _____ Mass: _____ (Element with most mass)

5. Use the periodic table to predict the identity of your elements and explain how you have come to these conclusions.

Element	Identity	Explanation
A		
B		
C		
D		
E		
F		
G		
H		
I		

6. Summarise the similarities between the way you have arranged your elements and the way they're arranged in the periodic table. What advantages might there be to arranging them like this?

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