Representing elements and compounds: knowledge check

1.1 This diagram shows the chemical symbols of the first twenty elements in the periodic table. 

Use some of the words to label the diagram with the names of the elements.

<table>
<thead>
<tr>
<th>neon</th>
<th>argon</th>
<th>aluminium</th>
<th>chlorine</th>
<th>potassium</th>
</tr>
</thead>
<tbody>
<tr>
<td>calcium</td>
<td>helium</td>
<td>sodium</td>
<td>carbon</td>
<td>oxygen</td>
</tr>
</tbody>
</table>

For questions 1.2 to 1.4, complete the sentences.

1.2 This model shows a molecule of the element chlorine.

![Molecule of chlorine](chlorine_molecule.png)

a) An element consists of ________________ type of atom only.

b) There are 92 naturally occurring ________________ .

c) A chemical symbol represents ________________ atom of an element. For example, the symbol Ne represents one atom of ________________ .

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d) Some elements naturally exist as two or more atoms bonded together to form ________________ .

e) A molecule of chlorine gas has the chemical formula Cl₂. The subscript ‘2’ shows that there are ________________ atoms of chlorine bonded together in one molecule.

1.3 A compound consists of two or ________________ different types of atoms bonded together. Compounds with ________________ bonds form molecules. They have a chemical formula showing the numbers and types of atoms in one molecule of the compound. For example, a molecule of NH₃ contains ________________ atom of nitrogen and ________________ atoms of hydrogen. A molecule of C₂H₅OH contains ________________ atoms of carbon, six atoms of hydrogen and one atom of oxygen. This model shows a ________________ of C₂H₅OH.
1.4 Compounds with ________ bonding form ionic structures. This model shows part of the ionic structure of sodium chloride:

![Ionic structure of sodium chloride]

The ionic structure consists of many ________ ions and many ________ ions, but its chemical formula is NaCl. This shows there is ________ sodium ion to every chloride ion. The compound magnesium chloride also has ionic bonding. Its chemical formula is MgCl₂. An ionic structure of magnesium chloride contains ________ magnesium ion to every ________ chloride ions.

Representing elements and compounds: test myself

2.1 The chemical formula for naturally occurring sulfur is S₈. Circle the type of particle that is S₈.

- an atom
- a compound
- a molecule
- an ion

2.2 Which of these chemical formulas represents an element? Circle the correct answer.

CaO  Ni  NO  NaOH  SO₂
2.3 Which of these chemical formulas represents an element that exists as single atoms? Circle the correct answer.

N₂  HCl  Ar  NO  I₂

2.4 Which two of these chemical formulas represent compounds? Circle the correct answers.

NO  N₂  NH₃  He  Br₂

2.5 If the blue sphere in this image represents a nitrogen atom and the white spheres represent hydrogen atoms, what is the formula?

The formula is

2.6 How many atoms of hydrogen are contained in one molecule of CH₃COOH?

[Hint: Circle all the hydrogen atoms in the formula.]
2.7 Magnesium oxide has ionic bonding. Its chemical formula is \( \text{MgO} \). What is the ratio of magnesium ions to oxide ions in a magnesium oxide particle?

[Hint: Think about how many ions of magnesium and oxide are represented in the formula.]

2.8 Sodium oxide also has ionic bonding. Its chemical formula is \( \text{Na}_2\text{O} \). What is the ratio of sodium ions to oxide ions in a particle of sodium oxide?

[Hint: Think about how many ions of sodium and oxide are represented in the formula]

2.9 Which of these images shows a model of an element? Circle the correct answer.

A

B

C

D
2.10 Look at the models in question 2.9 again. Which image shows an ionic compound?

Representing elements and compounds: feeling confident?

3.1 Polymers, like poly(ethene), consist of large molecules. These are chains of atoms with repeating units. The formula for polyethene is written as:

\[
\begin{array}{c}
\text{H} \\
\text{C} \\
\text{H} \\
\text{H} \\
\text{C} \\
\text{H} \\
\text{H} \\
\end{array}
\]

where \( n \) stands for a large number.

Draw a length of poly(ethene) chain six carbon atoms long.
3.2 The table shows four different ways of representing a molecule of the compound ammonia, \( \text{NH}_3 \). The blue spheres represent nitrogen atoms and the white spheres represent hydrogen atoms.

Complete the table by adding a ✓ or a ✗. Some are done for you.

<table>
<thead>
<tr>
<th></th>
<th>( \text{NH}_3 )</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Does it show the different types of atoms?</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does it show how the atoms are arranged?</td>
<td>✗</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Does it show the molecule in three dimensions?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does it show the chemical bonds?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Representing elements and compounds: what do I understand?

Think about your answers and confidence level for each mini-topic. Decide whether you understand it well, are unsure or need more help. Tick the appropriate column.

<table>
<thead>
<tr>
<th>Mini-topic</th>
<th>I understand this well</th>
<th>I think I understand this</th>
<th>I need more help</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can write names of the elements from their chemical symbols.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can write chemical formulas of elements.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can write chemical formulas of simple molecular compounds.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can write chemical formulas of ionic compounds.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can use models to represent elements and compounds.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feeling confident? topics</th>
<th>I understand this well</th>
<th>I think I understand this</th>
<th>I need more help</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can write the chemical formula of a polymer.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can compare different types of representation.</td>
<td></td>
<td></td>
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</tbody>
</table>