

Representing elements and compounds

1 (a) Some elements exist as molecules. Write the chemical formula for each of the following:

i. a molecule of chlorine

_____ (1 mark)

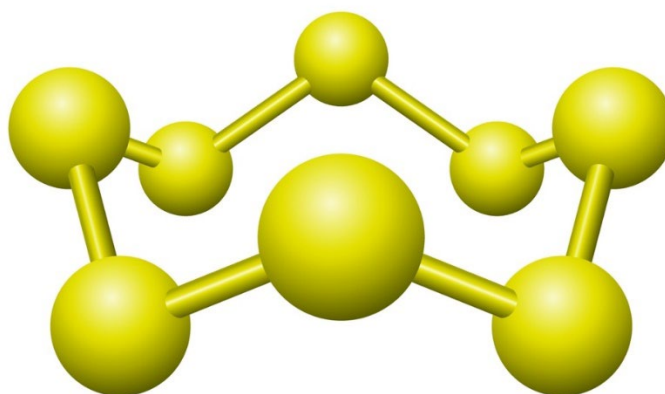
ii. a molecule of nitrogen

_____ (1 mark)

iii. a molecule of oxygen

_____ (1 mark)

(b) This is a molecule of sulfur. The spheres are sulfur atoms.



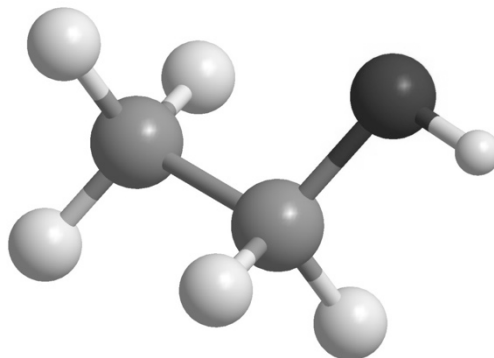
Source: © Shutterstock

What is the chemical formula for this molecule of sulfur?

_____ (1 mark)

2 This question is about the formulas of molecular compounds.

(a) The image shows a ball and stick model.



The spheres are colour coded: grey represents carbon, light grey represents hydrogen and black represents oxygen.

What is the chemical formula of the molecule shown in the image?

_____ (1 mark)

(b) The table shows the chemical formulas of some carbon molecular compounds.

Complete the table with the names and numbers of atoms in each compound. The first row has been completed for you.

Chemical formula of compound	Name of atoms in the compound	Number of each type of atom in the compound
C_2H_6	carbon, hydrogen	2 carbon atoms 6 hydrogen atoms
CO_2		
CH_3COOH		

(4 marks)

3 This question is about the chemical formulas of ionic compounds.

(a) The formula of sodium chloride is NaCl. What type of formula is NaCl?

Circle the correct answer.

(1 mark)

- A empirical formula
- B molecular formula
- C relative formula
- D structural formula

(b) Sodium is in group 1 and forms the ion Na^+ . Chlorine is in group 7 and forms the ion Cl^- . The formula of sodium chloride is NaCl.

Deduce the chemical formulas of each of the following compounds containing group 1 and group 7 elements.

i. potassium bromide

_____ (1 mark)

ii. lithium fluoride

_____ (1 mark)

iii. sodium iodide

_____ (1 mark)

(c) The table gives information about the ions formed by different elements and the group they are in. Use this information to answer the question.

Element	Group	Ion formed
magnesium	2	Mg^{2+}
calcium	2	Ca^{2+}
oxygen	6	oxide, O^{2-}
sulfur	6	sulfide, S^{2-}

Deduce the chemical formula of each of the following compounds formed from these elements.

i. magnesium oxide

_____ (1 mark)

ii. calcium sulfide

_____ (1 mark)

iii. magnesium chloride

_____ (1 mark)

iv. calcium fluoride

_____ (1 mark)

4 This question is also about the formulas of ionic compounds.

Use the formulas for the positive and negative ions provided to deduce the chemical formula of each of the ionic compounds listed.

Formulas of positive ions	Formulas of negative ions
Na^+	NO_3^-
Li^+	CO_3^{2-}
Ca^{2+}	SO_4^{2-}

(a) sodium nitrate

_____ (1 mark)

(b) lithium sulfate

_____ (1 mark)

(c) calcium carbonate

_____ (1 mark)

- 5 State symbols are used in chemical equations to tell us whether a substance is a solid, liquid, gas or whether it has been dissolved in water. Which equation shows a substance dissolving in water and reacting to form a gas?

Circle the correct answer.

(1 mark)

- A $2\text{Na(s)} + 2\text{H}_2\text{O(l)} \rightarrow 2\text{NaOH(aq)} + \text{H}_2\text{(g)}$
- B $\text{Fe}_2\text{O}_3\text{(s)} + 3\text{CO(g)} \rightarrow 2\text{Fe(s)} + 3\text{CO}_2\text{(g)}$
- C $\text{CuCO}_3\text{(s)} + 2\text{HCl(aq)} \rightarrow \text{CuCl}_2\text{(aq)} + \text{H}_2\text{O(l)} + \text{CO}_2\text{(g)}$
- D $2\text{NaOH(aq)} + \text{H}_2\text{SO}_4\text{(aq)} \rightarrow \text{Na}_2\text{SO}_4\text{(aq)} + \text{H}_2\text{O(l)}$

[Total: 21 marks]



Which question(s) did you get wrong? Why?

What will you do next time you're asked a similar question?