Write your name, centre number and candidate number in the boxes below.

| Surname | Other names |
|---|---|
| | |

Centre number | | | | | |

Candidate number | | | | |

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# Chemical formulae and equations

Time allowed: 20 minutes

**Subject code** **0620**

# Chemistry

**Questions from Paper 1, Paper 2 and Paper 4**

**You must have:** a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.

Total marks

**/ 16**

## Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.

## Information

- This paper has 10 questions worth 16 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

## Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

**1** A compound contains one atom of calcium, two atoms of hydrogen and two atoms of oxygen.

What is the correct chemical formula of the compound?

**A** $CaO_2H_2$ **B** HOCaOH **C** $H_2CaO_2$ **D** $Ca(OH)_2$

Chemical formulae and equations Click for more variations

**2** Methane, $CH_4$, burns in air to form carbon dioxide and water.

What is the balanced equation for this reaction?

**A** $CH_4(g) + O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

**B** $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

**C** $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + H_2O(g)$

**D** $CH_4(g) + 3O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

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**3** Which row shows the correct formulae of lead(II) bromide and butane?

| | lead(II) bromide | butane |
|---|---|---|
| **A** | $PbBr_2$ | $C_4H_8$ |
| **B** | $PbBr_2$ | $C_4H_{10}$ |
| **C** | $Pb_2Br$ | $C_4H_8$ |
| **D** | $Pb_2Br$ | $C_4H_{10}$ |

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**4** Which equation represents the reaction of magnesium with dilute hydrochloric acid?

**A** $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$

**B** $Mg(s) + 2HCl(l) \rightarrow MgCl_2(s) + H_2(g)$

**C** $2Mg(s) + 2HCl(aq) \rightarrow 2MgCl(aq) + H_2(g)$

**D** $2Mg(s) + 2HCl(l) \rightarrow 2MgCl(s) + H_2(g)$

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**5** Aluminium reacts with fluorine.

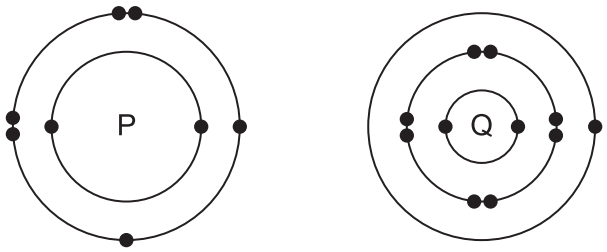
$$x\mathrm{A}l(\mathrm{s}) + y\mathrm{F}_2(\mathrm{g}) \rightarrow z\mathrm{A}l\mathrm{F}_3(\mathrm{s})$$

Which values of *x*, *y* and *z* balance the equation?

| | *x* | *y* | *z* |
|---|---|---|---|
| **A** | 1 | 2 | 1 |
| **B** | 2 | 3 | 2 |
| **C** | 3 | 2 | 3 |
| **D** | 4 | 3 | 4 |

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**6** The electronic structures of atoms P and Q are shown.




P and Q form an ionic compound.

What is the formula of the compound?

**A** PQ **B** $P_2Q$ **C** $P_2Q_3$ **D** $PQ_2$

Chemical formulae and equations Click for more variations

**7** Magnetite is an ore of iron which contains the ions $Fe^{2+}$, $Fe^{3+}$ and $O^{2-}$ only.

What is the formula of magnetite?

**A** $Fe_2O$ **B** $Fe_2O_3$ **C** $Fe_3O_2$ **D** $Fe_3O_4$

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**8** The equation for the reaction between iron(III) chloride and sodium hydroxide is shown.

$$FeCl_3(aq) + 3NaOH(aq) \rightarrow Fe(OH)_3(s) + 3NaCl(aq)$$

What is the ionic equation for this reaction?

**A** $Fe^{3+}(aq) + 3OH^-(aq) \rightarrow Fe^{3+}(s) + 3OH^-(s)$

**B** $Fe^{3+}(aq) + 3OH^-(aq) \rightarrow Fe(OH)_3(s)$

**C** $3Na^+(aq) + 3Cl^-(aq) \rightarrow 3Na^+(aq) + 3Cl^-(aq)$

**D** $3Na^+(aq) + 3Cl^-(aq) \rightarrow 3NaCl(aq)$

Chemical formulae and equations Click for more variations

**9** The molecular formulae of four compounds are listed.

1 $CH_4$

2 $C_2H_6$

3 $C_3H_8$

4 $C_3H_6$

Which molecular formulae are also the empirical formulae for the compounds?

**A** 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

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**10** Insoluble salts can be made by precipitation reactions.

A student mixed solutions of some soluble salts.

The results the student obtained are shown in the table.

| | | second salt solution | | |
|---|---|---|---|---|
| | | $Co(NO_3)_2(aq)$ | $AgNO_3(aq)$ | $Pb(NO_3)_2(aq)$ |
| first salt solution | NaI(aq) | no change | yellow precipitate | yellow precipitate |
| | $Na_2CO_3(aq)$ | purple precipitate | yellow precipitate | white precipitate |
| | $Na_2SO_4(aq)$ | no change | white precipitate | white precipitate |

All sodium salts are soluble in water.
Use only results from the table to answer the following questions.

**(a)** Name:

**(i)** an insoluble cobalt salt ..... [1]

**(ii)** an insoluble yellow lead salt. ..... [1]

**(b)** Write the chemical equation for the reaction in which silver carbonate is formed.

..... [2]

**(c)** Write the ionic equation for the reaction in which lead(II) iodide is formed.

..... [2]

**(d)** Aqueous silver nitrate produces a yellow precipitate with both iodide ions and carbonate ions. When testing an unknown solution for iodide ions, the aqueous silver nitrate is acidified.

Explain why the aqueous silver nitrate is acidified.

.....

..... [1]

[Total: 7]

Preparation of salts Click for more variations

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