# Quiz - Topic C1 Particles and Topic C2 Elements, compounds and mixtures

## Instructions and answers for teachers

These instructions cover the learner activity section which can be found on [page 14](#_Topic_B1_Cell). This quiz supports OCR GCSE (9-1) Chemistry A (Gateway Science), J248.

**When distributing the activity section to the learners either as a printed copy or as a Word file you will need to remove the teacher instructions section.**

### The Activity

This quiz is a teaching and learning resource containing 10 multiple choice questions on the theme of Particles and Elements, compounds and mixtures.

This resource can be used to test and consolidate understanding at the end of a topic or to revisit and refresh knowledge at a later point in the course.

### Learning Outcomes

This lesson element relates to the specification learning outcomes of

C1.1 – The particle model

C1.2 – Atomic structure

C2.1 – Purity and separating mixtures

C2.2 – Bonding

C2.3 – Properties of materials

### Introduction

Multiple choice questions allow rapid coverage of a wide range of sub-topics.

Contrary to a widespread belief among learners, multiple choice questions are not necessarily easy – they can be easy, moderate or difficult.

The questions are written so that the incorrect answers are plausible distractors based on common errors or misconceptions.

### Quiz - answers

Topic C1

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| **1** | | The distances between the particles of a substance in different states vary.  Which order is correct, starting with the shortest distance? **[1]** | |
|  | | **A** | Gas; solid; liquid |
|  | |  | Incorrect - particles in a gas are furthest apart. |
|  | | **B** | Liquid; gas; solid |
|  | |  | Incorrect - particles in a solid are the closest together. |
|  | | **C** | Solid; liquid; gas |
|  | |  | Correct answer. |
|  | | **D** | Solid; gas; liquid |
|  | |  | Incorrect - solid correct but particles in a liquid are closer than in a gas.  C |
|  | Your answer | | |

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| **2** | | Which of the following describes a chemical change? **[1]** | |
|  | | **A** | Sodium chloride dissolving |
|  | |  | Incorrect - physical change. |
|  | | **B** | Ether evaporating |
|  | |  | Incorrect - physical change. |
|  | | **C** | Using lemon juice to relieve a wasp sting |
|  | |  | Correct answer – neutralisation therefore chemical change. |
|  | | **D** | Ice melting |
|  | |  | Incorrect - physical change.  C |
|  | Your answer | | |

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| **3** | | What is the distance between the atoms in a molecule of bromine, Br2. **[1]** | |
|  | | **A** | 1.9 x 10–6 |
|  | |  | Incorrect – order of magnitude too high. |
|  | | **B** | 1.9 x 10–10 |
|  | |  | Correct answer. |
|  | | **C** | 1.9 x 10–12 |
|  | |  | Incorrect – order of magnitude too small. |
|  | | **D** | 1.9 x 10–8 |
|  | |  | Incorrect – order of magnitude too high.  B |
|  | Your answer | | |

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| **4** | | Distances between nitrogen molecules are 300 times the molecular radius. The molecular diameter is 3.64 X10-10 m. What would be the distance between the nitrogen molecules in metres? **[1]** | |
|  | | **A** | 1.1 X10–6 |
|  | |  | Incorrect - used the diameter rather than the radius and error in powers calculation. |
|  | | **B** | 5.46 x10–8 |
|  | |  | Correct answer - 150 x diameter = 300x diameter/2 |
|  | | **C** | 5.46 x 10–7 |
|  | |  | Incorrect – error in powers calculation. |
|  | | **D** | 1.1 x 10–7 |
|  | |  | Incorrect - used the diameter rather than the radius.  B |
|  | Your answer | | |

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| **5** | | Chemical changes differ from physical changes as shown by: **[1]** | |
|  | | **A** | A change in arrangement of atoms resulting in a new set of chemical properties. |
|  | |  | Correct answer. |
|  | | **B** | A change in arrangement of atoms resulting in no change in chemical properties. |
|  | |  | Incorrect - products have different properties. |
|  | | **C** | A change in distance between particles resulting in a change of state. |
|  | |  | Incorrect – describes a physical change. |
|  | | **D** | A change in distance between particles, resulting in no change in the particles. |
|  | |  | Incorrect – describes a physical change.  A |
|  | Your answer | | |

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| --- | --- | --- | --- |
| **6** | | Which of the following describes the sub-atomic particles in an atom of 81Br?  (protons, electrons, neutrons) **[1]** | |
|  | | **A** | 35, 46, 35 |
|  | |  | Incorrect - electrons and neutons transposed. |
|  | | **B** | 35, 35, 46 |
|  | |  | Correct answer. |
|  | | **C** | 35, 46, 46 |
|  | |  | Incorrect - wrong number of electrons (matched with neutrons rather than protons). |
|  | | **D** | 46, 35, 35 |
|  | |  | Incorrect - protons and neutrons transposed.  B |
|  | Your answer | | |

Topic C2

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| --- | --- | --- | --- |
| **7** | | Glucose is the main energy store in biological systems. Its molecular formula is C6H12O6  What is the empirical formula of glucose? **[1]** | |
|  | | **A** | CHO |
|  | |  | Incorrect – not in correct ratio. |
|  | | **B** | C2H4O2 |
|  | |  | Incorrect – not in the lowest ratio. |
|  | | **C** | C3H6O3 |
|  | |  | Incorrect – not in the lowest ratio. |
|  | | **D** | CH2O |
|  | |  | Correct answer.  D |
|  | Your answer | | |

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| **8** | | In winemaking, the dead yeast remaining after the fermentation forms a fine, light sludge called the lees.  Which method would the most efficient at removing the lees from the wine? **[1]** | |
|  | | **A** | Distillation |
|  | |  | Incorrect – would change wine to a spirit |
|  | | **B** | chromatography |
|  | |  | Incorrect – not used for separation. |
|  | | **C** | Filtration |
|  | |  | Correct answer. |
|  | | **D** | Sieving |
|  | |  | Incorrect - the lees would travel through a sieve as the holes would be too large.  C |
|  | Your answer | | |

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| **9** | | The blades in jet engines are grown as single crystals. The structure of the crystal is shown below. What is this substance? **[1]**  structure of crystal arrangement | |
|  | | **A** | Sulfur |
|  | |  | Incorrect - is a non-metal. |
|  | | **B** | Titanium |
|  | |  | Correct answer – a metal. |
|  | | **C** | Copper sulfate |
|  | |  | Incorrect - it is a salt. |
|  | | **D** | Silicon dioxide |
|  | |  | Incorrect - is a covalent compound.  B |
|  | Your answer | | |

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| **10** | | What is the electronic configuration for Sulfur? **[1]** | |
|  | | **A** | 6, 8, 2 |
|  | |  | Incorrect - Order reversed. |
|  | | **B** | 2, 8, 6 |
|  | |  | Correct answer. |
|  | | **C** | 2, 8, 8 |
|  | |  | Incorrect - sulpfur is in Group 6 (16) so has 6 electrons in its outer shell. |
|  | | **D** | 8, 2, 6 |
|  | |  | Incorrect - wrong order.  B |
|  | Your answer | | |

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| **11** | | A metal A forms the ion A2+ with 10 electrons.  What is the name the ion? **[1]** | |
|  | | **A** | Calcium ion |
|  | |  | Incorrect – 2+ charge but 18 electrons. |
|  | | **B** | Magnesium ion |
|  | |  | Correct answer. |
|  | | **C** | Beryllium ion |
|  | |  | Incorrect –2+ charge but 2 electrons. |
|  | | **D** | strontium ion |
|  | |  | Incorrect –2+ charge but 36 electrons.  B |
|  | Your answer | | |

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| **12** | | Name the type of bonding and the compound indicated by the diagram. **[1]**  bonding of a compound | |
|  | | **A** | Ionic, magnesium chloride |
|  | |  | Incorrect – identification of cation incorrect. |
|  | | **B** | Covalent, calcium chloride |
|  | |  | Incorrect - identification of bonding incorrect. |
|  | | **C** | Ionic, calcium fluoride |
|  | |  | Incorrect – identification of the anion incorrect |
|  | | **D** | Ionic, calcium chloride |
|  | |  | Correct answer.  D |
|  | Your answer | | |
| **13** | | How many covalent bonds can carbon form? **[1]** | |
|  | | **A** | 1 |
|  | |  | Incorrect. |
|  | | **B** | 2 |
|  | |  | Incorrect. |
|  | | **C** | 3 |
|  | |  | Incorrect. |
|  | | **D** | 4 |
|  | |  | Correct – carbon has 4 electrons in its outer shell to share covalently.  D |
|  | Your answer | | |

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| **14** | | Which of the elements conducts electricity as a solid at room temperature? **[1]**   |  |  |  | | --- | --- | --- | |  | Melting point oC | Boiling Point o C | | Sodium chloride | 801 | 1413 | | Bromine | 8 | 59 | | Diamond | 3550 | 4830 | | Graphite | N/A | 3730 (sublimes) | | |
|  | | **A** | Sodium chloride |
|  | |  | Incorrect - needs to be molten. |
|  | | **B** | Bromine |
|  | |  | Incorrect - covalent molecule. |
|  | | **C** | Diamond |
|  | |  | Incorrect - no free electrons. |
|  | | **D** | Graphite |
|  | |  | Correct answer – free delocalised electrons.  D |
|  | Your answer | | |

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| **15** | | Which of the following Bohr diagrams shows the sodium ion? **[1]** | |
|  | | **A** | Bohr diagram of sodium atom |
|  | |  | Incorrect – sodium atom. |
|  | | **B** | Bohr diagram of an aluminium atom |
|  | |  | Incorrect - aluminum atom. |
|  | | **C** | Bohr diagram of atom missing outer electron |
|  | |  | Correct – outer electron missing so sodium ion. |
|  | | **D** | Bohr diagram of magnesium atom |
|  | |  | Incorrect – magnesium atom.  C |
|  | Your answer | | |

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| 1**6** | | On a chromatogram, a substance has with an Rf value of 0.77.  If the solvent front travels 12cm from the baseline, at what distance from the baseline will the spot be found. **[1]** | |
|  | | **A** | 9.2cm |
|  | |  | Correct answer. |
|  | | **B** | 7.7cm |
|  | |  | Incorrect - assumed solvent front moved 10cm. |
|  | | **C** | 9.0cm |
|  | |  | Incorrect - estimated three quarters of 12cm. |
|  | | **D** | 0.1cm |
|  | |  | Incorrect - divided by 12cm.  A |
|  | Your answer | | |

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| **17** | | What is the empirical formula for a substance that has 66.67% carbon, 22.22% oxygen and 11.11% hydrogen? **[1]** | |
|  | | **A** | C5.56H11.11O1.39 |
|  | |  | Incorrect – ratios not converted to whole numbers by dividing by smallest molarity. |
|  | | **B** | CH2O0.25 |
|  | |  | Incorrect – did not use the smallest number of moles to divide down ratios. |
|  | | **C** | C4H8O |
|  | |  | Correct answer. |
|  | | **D** | C6H1O2 |
|  | |  | Incorrect – did not convert into moles.  C |
|  | Your answer | | |

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| **18** | | Use the Periodic Table to find the element which is in Period 4 and Group 16 (6) How many neutrons are in one atom of this element? **[1]** | |
|  | | **A** | 2 |
|  | |  | Incorrect – charge of ion. |
|  | | **B** | 34 |
|  | |  | Incorrect – number of protons. |
|  | | **C** | 79 |
|  | |  | Incorrect – relative atomic mass |
|  | | **D** | 45 |
|  | |  | Correct answer.  D |
|  | Your answer | | |

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| **19** | | A product development engineer is looking for a material to make a threaded insulating plug for an immersion heater.  Which of the following polymers would be most suitable given the high temperatures that might be encountered? **[1]**   |  |  |  | | --- | --- | --- | | Polymer | Hardness | Softening point oC | | Nylon | Soft | 265 | | Polyethene | Soft | 80 | | Polypropene | Soft | 171 | | Bakelite | Hard | Doesn’t melt | | |
|  | | **A** | Nylon |
|  | |  | Incorrect - softens on heating. |
|  | | **B** | Polyethene |
|  | |  | Incorrect - softens on heating. |
|  | | **C** | Polypropene |
|  | |  | Incorrect - softens on heating. |
|  | | **D** | Bakelite |
|  | |  | Correct answer.  D |
|  | Your answer | | |

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| **20** | | Silicon dioxide is a covalent compound with a giant 3D lattice structure. Which best describes the physical properties of silicon dioxide? **[1]** | |
|  | | **A** | Low melting point, soft |
|  | |  | Incorrect – substances with giant 3D covalent lattices are hard with high melting points. |
|  | | **B** | High melting point, hard |
|  | |  | Correct answer. |
|  | | **C** | Low melting point, hard |
|  | |  | Incorrect |
|  | | **D** | High melting point, soft |
|  | |  | Incorrect  B |
|  | Your answer | | |



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# Quiz - Topic C1 Particles and Topic C2 Elements, compounds and mixtures

## Learner Activity

Topic C1

|  |  |  |  |
| --- | --- | --- | --- |
| **1** | | The distances between the particles of a substance in different states vary.  Which order is correct, starting with the shortest distance? **[1]** | |
|  | | **A** | Gas; solid; liquid |
|  | | **B** | Liquid; gas; solid |
|  | | **C** | Solid; liquid; gas |
|  | | **D** | Solid; gas; liquid |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **2** | | Which of the following describes a chemical change? **[1]** | |
|  | | **A** | Sodium chloride dissolving |
|  | | **B** | Ether evaporating |
|  | | **C** | Using lemon juice to relieve a wasp sting |
|  | | **D** | Ice melting |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **3** | | What is the distance between the atoms in a molecule of bromine, Br2. **[1]** | |
|  | | **A** | 1.9 x 10–6 |
|  | | **B** | 1.9 x 10–10 |
|  | | **C** | 1.9 x 10–12 |
|  | | **D** | 1.9 x 10–8 |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **4** | | Distances between nitrogen molecules are 300 times the molecular radius. The molecular diameter is 3.64 x10–10 m. What would be the distance between the nitrogen molecules in metres? **[1]** | |
|  | | **A** | 1.09 X10–6 |
|  | | **B** | 5.46 x10–8 |
|  | | **C** | 5.46 x 10–7 |
|  | | **D** | 1.09 x 10–7 |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **5** | | Chemical changes differ from physical changes as shown by: **[1]** | |
|  | | **A** | A change in arrangement of atoms resulting in a new set of chemical properties. |
|  | | **B** | A change in arrangement of atoms resulting in no change in chemical properties. |
|  | | **C** | A change in distance between particles resulting in a change of state. |
|  | | **D** | A change in distance between particles, resulting in no change in the particles. |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **6** | | Which of the following describes the sub-atomic particles in an atom of 81Br?  (protons, electrons, neutrons) **[1]** | |
|  | | **A** | 35, 46, 35 |
|  | | **B** | 35, 35, 46 |
|  | | **C** | 35, 46, 46 |
|  | | **D** | 46, 35, 35 |
|  | Your answer | | |

Topic C2

|  |  |  |  |
| --- | --- | --- | --- |
| **7** | | Glucose is a main energy store in biological systems. Its molecular formula is C6H12O6  What is the empirical formula of glucose? **[1]** | |
|  | | **A** | CHO |
|  | | **B** | C2H4O2 |
|  | | **C** | C3H6O3 |
|  | | **D** | CH2O |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **8** | | In winemaking, the dead yeast remaining after the fermentation forms a fine, light sludge called the lees.  Which method would the most efficient at removing the lees from the wine? **[1]** | |
|  | | **A** | Distillation |
|  | | **B** | Chromatography |
|  | | **C** | Filtration |
|  | | **D** | Sieving |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **9** | | Structure of crystal arrangementThe blades in jet engines are grown as single crystals. The structure of the crystal is shown below. What is this substance? **[1]** | |
|  | | **A** | Sulfur |
|  | | **B** | Titanium |
|  | | **C** | Copper sulfate |
|  | | **D** | Silicon dioxide |
|  | Your answer | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **10** | | What is the electronic configuration for Sulfur? **[1]** | | |
|  | | **A** | 6, 8, 2 | |
|  | | **B** | 2, 8, 6 | |
|  | | **C** | 2, 8, 8 | |
|  | | **D** | 8, 2, 6 | |
|  | Your answer | | | |
| **11** | | A metal A forms the ion A2+ with 10 electrons.  What is the name the ion? **[1]** | |
|  | | **A** | Calcium ion |
|  | | **B** | Magnesium ion |
|  | | **C** | Beryllium ion |
|  | | **D** | Strontium ion |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **12** | | Name the type of bonding and the compound indicated by the diagram. **[1]**  bonding of a compound | |
|  | | **A** | Ionic, magnesium chloride |
|  | | **B** | Covalent, calcium chloride |
|  | | **C** | Ionic, calcium fluoride |
|  | | **D** | Ionic, calcium chloride |
|  | Your answer | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **13** | | How many covalent bonds can carbon form? **[1]** | | |
|  | | **A** | 1 | |
|  | | **B** | 2 | |
|  | | **C** | 3 | |
|  | | **D** | 4 | |
|  | Your answer | | | |
|  |  | | | |
| **14** | | Which of the elements conducts electricity as a solid at room temperature? **[1]**   |  |  |  | | --- | --- | --- | |  | Melting point in oC | Boiling Point in o C | | Sodium chloride | 801 | 1413 | | Bromine | 8 | 59 | | Diamond | 3550 | 4830 | | Graphite | N/A | 3730 (sublimes) | | |
|  | | **A** | Sodium chloride |
|  | | **B** | Bromine |
|  | | **C** | Diamond |
|  | | **D** | Graphite |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **15** | | Which of the following Bohr diagrams shows the sodium ion? **[1]** | |
|  | | **A** | Bohr diagram of atom |
|  | | **B** | Bohr diagram of atom |
|  | | **C** | Bohr diagram of atom |
|  | | **D** | Bohr diagram of atom |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| 1**6** | | On a chromatogram, a substance has an Rf value of 0.77.  If the solvent front travels 12cm from the baseline, at what distance from the baseline will the spot be found. **[1]** | |
|  | | **A** | 9.2cm |
|  | | **B** | 7.7cm |
|  | | **C** | 9.0cm |
|  | | **D** | 0.1cm |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **17** | | What is the empirical formula for a substance that has 66.67% carbon, 22.22% oxygen and 11.11% hydrogen? **[1]** | |
|  | | **A** | C5.56H11.11O1.39 |
|  | | **B** | CH2O0.25 |
|  | | **C** | C4H8O |
|  | | **D** | C6H1O2 |
|  | Your answer | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **18** | | Use the Periodic Table to find the element which is in Period 4 and Group 16. How many neutrons are in one atom of this element? **[1]** | |
|  | | **A** | 2 |
|  | | **B** | 34 |
|  | | **C** | 79 |
|  | | **D** | 45 |
|  | Your answer | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **19** | | A product development engineer is looking for a material to make a insulating plug for an immersion heater.  Which of the following polymers would be most suitable given the high temperatures that might be encountered? **[1]**   |  |  |  | | --- | --- | --- | | Polymer | Hardness | Softening point oC | | Nylon | Soft | 265 | | Polyethene | Soft | 80 | | Polypropene | Soft | 171 | | Bakelite | Hard | Doesn’t melt | | |
|  | | **A** | Nylon |
|  | | **B** | Polyethene |
|  | | **C** | Polypropene |
|  | | **D** | Bakelite |
|  | Your answer | | |

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| **20** | | Silicon dioxide is a covalent compound with a giant 3D lattice structure. Which best describes the physical properties of silicon dioxide. **[1]** | |
|  | | **A** | Low melting point, soft |
|  | | **B** | High melting point, hard |
|  | | **C** | Low melting point, hard |
|  | | **D** | High melting point, soft |
|  | Your answer | | |