**The periodic table (answers)**

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| Instructions to students  • You have 50 minutes to complete the test.  • Please answer all questions in the spaces provided.  • There is to be no talking during the test. | Marks  Section I: Multiple-choice questions: 10 marks  Section II: Short-answer questions: 30 marks  Section III: Extended-response questions: 10 marks  Total: 50 marks |

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| Comments: | |

Section I: Multiple-choice questions

For each question, circle the correct answer.

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| 1 Which group of elements can be described by the following statement?   ‘These elements have quite a low melting point and are soft and highly reactive. In their pure state, they often resemble Plasticine that, when cut, is very briefly shiny silver before reacting with the air to become white again.’ | | L:\1. Publishing and Editorial\1. Product\Oxford Science\Oxford Science VICTORIA\Oxford Science 10 VIC\2. Extras\16. Class tests\Artwork\Final jpegs\CT0301_07059-rm.jpg |
| A | alkali metals |
| B | alkaline earth metals |
| C | transition metals |
| D | metalloids |
| 2 Melting points and boiling points of halogens increase: | | |
| A | across the periodic table, left to right. | |
| B | across the periodic table, right to left. | |
| C | down the periodic table. | |
| D | up the periodic table. | |
| 3 The atomic number of calcium is 20. The electron configuration will be: | | |
| A | 2, 10, 8 | |
| B | 2, 8, 10 | |
| C | 2, 8, 8, 2 | |
| D | 8, 8, 4 | |

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| 4 This atom represents the element: | | |
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| A | copper. | |
| B | sodium. | |
| C | nitrogen. | |
| D | oxygen. | |
| 5 How many valence electrons does a fluorine atom have? | | |
| A | 9 | |
| B | 7 | |
| C | 10 | |
| D | 8 | |
| 6 In a chemical reaction, a potassium atom is most likely to: | | |
| A | lose two electrons. | |
| B | gain two electrons. | |
| C | lose one electron. | |
| D | gain one electron. | |
| 7 Which of the following statements is true? | | |
| A | All metals conduct electricity in the solid state. | |
| B | Most metals conduct electricity in the solid state. | |
| C | Some metals conduct electricity in the solid state. | |
| D | No metals conduct electricity in the solid state. | |
| 8 Which property do metalloids share with metals? | | L:\1. Publishing and Editorial\1. Product\Oxford Science\Oxford Science VICTORIA\Oxford Science 10 VIC\2. Extras\16. Class tests\Artwork\Final jpegs\CT0303_07059-r.jpg |
| A | Malleability |
| B | Ductility |
| C | Electrical conductivity |
| D | Lustre |
| 9 The formula for copper sulphide is: | | |
| A | CuS2. | |
| B | CuS3. | |
| C | CuS. | |
| D | Cu2S. | |
| 10 Noble gases are all: | | |
| A | rare. | |
| B | unreactive. | |
| C | conductive. | |
| D | radioactive**.** | |

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|  | Section I total marks:  /10 marks |

Section II: Short-answer questions

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| 11 Give the formulas for the following ionic compounds. | |
| |  |  | | --- | --- | | Ionic compound | Formula | | Silver bromide | AgBr | | Calcium iodide | CaI2 | | Zinc nitride | Zn3N2 | | |
|  | /3 marks |
| 12 Explain how Mendeleev was able to predict the existence of elements that hadn’t been discovered yet. | |
| By arranging the elements into the periodic table, Mendeleev was able to see where gaps were, indicating not-yet-discovered elements. Based on the group and period of the element, accurate predictions about its properties could be made. | |
|  | /2 marks |
| 13 What is the main difference in properties between alkali metals and alkaline earth metals? | |
| Because alkali metals have only one valence electron, they are more reactive than alkaline earth metals. | |
|  | /2 marks |

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| 14 What is the name given to the group of elements found between the metals and non-metals? Give one property this group shares with the metals and one property this group share with the non-metals. | | | |
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| Metalloids (1 mark)  Conduct electricity like the metals (1 mark)  Any property similar to non-metals, e.g. not lustrous, not ductile (1 mark) | | | |
|  | | /3 marks | |
| 15 What are delocalised electrons? How do they relate to the lustre and electrical conductivity of a metal? | | | |
| A delocalised electron is one that is free to move around a substance (1 mark). The lustre of a metal is produced when delocalised electrons at the surface reflect light (1 mark). Delocalised electrons move randomly in a metal, but move towards a positive terminal of power source when connected to a circuit, and so conduct electricity (1 mark). | | | |
|  | /3 marks | |

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| 16 Silver has a greater electrical conductivity than copper. Give a reason why we use copper in wires instead of silver. | | |
| Any one of: silver is more expensive, silver is heavier than copper, copper is much more common. | | |
|  | /1 mark |
| 17 Draw electron shell diagrams in the space provided below for lithium and fluorine. | | |
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|  | /2 marks |
| 18 What is a semiconductor? Give two examples of elements that are semiconductors. | | |
| A semiconductor is a metalloid that can conduct electricity in a certain way under certain conditions (that way is very predictable). Silicon and germanium are semiconductors. | | |
|  | /3 marks |

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| 19 Radon is a very dangerous noble gas that can be found in natural springs. Explain why radon is so dangerous. | | | |
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| It is radioactive or the decay product of uranium (1 mark). Humans can be exposed to radiation from radon as it occurs naturally in the environment (1 mark). | | | |
|  | /2 marks | |
| 20 What sort of molecule is shown in the diagram? Why does the number of electrons not equal the number of protons in each atom? | | | |
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| Water molecule. The oxygen and hydrogen atoms share electrons through covalent bonding. | | | |
|  | /2 marks | |
| 21 Complete the table by filling in the spaces for the missing element names, atomic numbers and electron configurations. | | | |
| |  |  |  | | --- | --- | --- | | Element | Atomic number | Electron configuration | | Nitrogen | 7 | 2, 5 | | Neon | 10 | 2 8 | | Magnesium | 12 | 2,8,2 | | Phosphorus | 15 | 2,8,5 | | Potassium | 19 | 2,8,7 |   1 mark for each correct row | | | |
|  | | /5 marks | |
| 22 Why are ionic compounds difficult to melt? | | | |
| Ionic compounds are very stable due to very strong electrostatic forces. This means a lot of energy is required to move the ions out of position, and so these compounds are difficult to melt. | | | |
|  | | /2 marks | |
|  | | Section II total marks:  /30 marks | |

Section III: Extended-response questions

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| 23 Nitinol is an example of a memory alloy made from nickel and titanium. Explain how nitinol is created and why it is a benefit to use nitinol in eye glasses and dental wire. | |
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| The metals nickel and titanium are melted and mixed to create nitinol (1 mark). The nitinol is cast into a particular shape and heated to 500°C (1 mark). This results in the atoms arrange themselves into a compact and regular pattern (1 mark). Creating a memory of this shape (1 mark). If the glasses are bent out of shape, or the dental wire is heated and changes shape, they will always return to their original shape (1 mark). | |
|  | /5 marks |

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| 24 Outline how the Bohr model can be used to explain how electrons are arranged in an atom. | |
| Students’ answers will vary.  The Bohr atomic model uses electron shells to determine the distance electrons are from the nucleus (1 mark). The further the shell is from the nucleus, the more electrons it can contain (1 mark). The negatively charged electrons are attracted to the positively charged nucleus, and so the shells fill up from the inside (1 mark). The maximum number of electrons in a shell is given by the formula 2*n*2, where *n* is the shell number (1 mark). Once the third electron shell has eight electrons, the remaining electrons start moving into the fourth shell (1 mark). | |
|  | /5 marks |
|  | Section III total marks:  /10 marks |