**Chemical reactions (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: 34 marks  Section III: Extended-response questions: 6 marks  Total: 50 marks |

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| Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Class: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Score: /50  Grade: % |
| Comments: | |

Section I: Multiple-choice questions

For each question, circle the correct answer.

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| 1 The following reaction shows yellow, insoluble lead iodide forming when lead nitrate is added to potassium iodide. This is an example of a: | | L:\1. Publishing and Editorial\1. Product\Oxford Science\Oxford Science VICTORIA\Oxford Science 10 VIC\2. Extras\16. Class tests\Artwork\Final jpegs\CT0401_07059-rm.jpg |
| A | precipitation reaction. |
| B | decomposition reaction. |
| C | neutralisation reaction. |
| D | synthesis reaction. |
| 2 Compared to particles in a cold substance, particles in a hot substance have more: | | |
| A | light energy. | |
| B | kinetic energy. | |
| C | chemical potential energy. | |
| D | gravitational potential energy. | |
| 3 Catalysts are often used in industry because they: | | |
| A | allow reactions to go to completion. | |
| B | reduce the temperature at which a reaction occurs. | |
| C | make a reaction go faster. | |
| D | make it easier for reactants to react with one another. | |

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| 4 Why does increasing the surface area of a reactant increase the speed of some chemical reactions? | |
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| A | It increases the density of the reactant particles. |
| B | It increases the concentration of the reactant. |
| C | It alters the electrical conductivity of the reactant particles. |
| D | It exposes more reactant particles to a possible collision. |
| 5 The combustion of propane can be written by the following chemical equation:  C3H8 + 5O2 → 3CO2 + 4H2O  What are the products in this equation? | |
| A | C3H8 and 3CO2 |
| B | 3CO2 and 4H2O |
| C | C3H8 and 5O2 |
| D | 4H2O and 5O2 |
| 6 A substance that can supply or take the place of oxygen in a chemical reaction is known as: | |
| A | an oxide. |
| B | an oxate. |
| C | an oxidant. |
| D | a hydroxide. |

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| 7 2 Mg(s) + O2(g) → 2MgO(s)  The above equation is what type of reaction? | |
| A | Combustion |
| B | Decomposition |
| C | Respiration |
| D | Synthesis |
| 8 The greatest concentration of the ozone layer is at an altitude of: | |
| A | 10 km. |
| B | 50 km. |
| C | 20 km. |
| D | 30 km. |
| 9 Complete the equation: acid + metal hydroxide → salt + \_\_\_\_\_\_\_ | |
| A | hydrogen |
| B | oxygen |
| C | carbon dioxide |
| D | water |
| 10 A monomer is a: | |
| A | product of a monomatic reaction. |
| B | small molecule that makes up a polymer. |
| C | synthetic polymer. |
| D | compound that can be synthesised in a laboratory. |

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|  | Section I total marks:  /10 marks |

Section II: Short-answer questions

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| 11 What are the advantages of using nylon rather than canvas in tent manufacture? Are there any disadvantages? | |
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| The advantages of nylon rather than canvas in tent-making include: nylon is stronger, more resistant to tearing, lighter and more waterproof. The drawback is that, over time, nylon may weaken due to UV radiation from the Sun. | |
|  | /3 marks |
| 12 Give three examples of ways green chemistry has helped the environment. | |
| Any reasonable answer, such as acrylic paints replacing enamel, new refrigerants developed to replace CFCs, and development of biodegradable poisons in agriculture. | |
|  | /3 marks |

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| 13 The following chemical reactions happen between CFCs and the atmosphere:  CCl2F2 + h → CClF2 + Cl  Cl + O3 → ClO + O2  ClO + O → Cl + O2  What happens to the chlorine atom emitted in the first equation? Why is this so bad? | |
| The chlorine atom from the first equation reacts with an ozone molecule in the second equation. This converts the ozone into O2, effectively removing an ozone molecule from the atmosphere. In the third equation, the original chlorine molecule is released. This is a problem because a single chlorine atom can destroy many, many ozone molecules before being used up. | |
|  | /3 marks |
| 14 Methane gas (CH4) is used in gas heaters in homes all around Victoria during winter. When the heater is ignited, methane combines with the oxygen in the air to form carbon dioxide and water.  Write a word and chemical equation for the combustion of methane (CH4) in the space provided below. Make sure your chemical equation is balanced. | |
| methane + oxygen 🡪 carbon dioxide + water (1 mark)  CH4 + 2O2 🡪 CO2 + 2H2O (1 mark for each correct) | |
|  | /5 marks |

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| 15 In the future, your family might be driving a car fuelled by hydrogen. Give one advantage and one disadvantage of using hydrogen as a fuel source. | |
| Advantage: there are no carbon emissions; only water is produced.  Disadvantage: hydrogen is highly flammable/dangerous; is not controlled correctly. | |
|  | /2 marks |
| 16 Use the chemical equation below to answer the following questions:  2Al2O3  → 4Al + 3O2  a Identify one product in this reaction.  b Is this chemical equation balanced? Explain your answer.  c What type of reaction is this? | |
| a Aluminium or oxygen (1 mark)  b Yes, it fits the law of conservation of mass. There are 4 aluminium atoms and 6 oxygen atoms in the reactants and 4 aluminium atoms and 6 oxygen atoms in the products (2 marks).  c Decomposition reaction (1 mark) | |
|  | /4 marks |

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| 17 What is the difference between thermal decomposition and electrolytic decomposition? | |
| Thermal decompositions use heat to provide energy for this reaction. Electrolytic decompositions use electricity to provide energy for this reaction. | |
|  | /2 marks |
| 18 What is a polymer? How is it formed? | |
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| A polymer is a long-chain molecule made up of many smaller repeating molecules/monomers (1 mark). Polymers are formed by placing monomers under conditions that allow them to join together in a polymerisation reaction (1 mark). | |
|  | /2 marks |
| 19 Describe three ways you could increase the rate of a reaction. | |
| Increasing the temperature; increasing the concentration; increasing the surface area; stirring the reactants. | |
|  | /3 marks |
| 20 Name the acid, the metal and the salt in the following reaction:  hydrochloric acid + magnesium → magnesium chloride + hydrogen | |
| Acid: hydrochloric acid; metal: magnesium; salt: magnesium chloride | |
|  | /3 marks |
| 21 What is quicklime used for? How is it produced? | |
| Quicklime is used in agriculture (as fertiliser and to neutralise acidic soil) and as a component in building materials. It is produced by the thermal decomposition of calcium carbonate, such as limestone. | |
|  | /3 marks |
| 22 What is the law of conservation of mass? | |
| The law of conservation of mass states that in a chemical reaction, the total mass of all reactants is equal to the total mass of all the products. | |
|  | /1 mark |
|  | Section II total marks:  /34 marks |

Section III: Extended-response questions

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| 23 Jane and Jacki were doing an experiment to investigate the effect of acid on magnesium at different solution temperatures and for different lengths of ribbon. They were provided with a Bunsen burner, a tripod, a measuring beaker, test tubes, a gauze mat, a bottle of hydrochloric acid, a roll of magnesium ribbon, some scissors and a thermometer. Their results are shown in the table below. |
| |  |  |  | | --- | --- | --- | | Temperature of solution (°C) | Length of magnesium ribbon (cm) | Time taken for the magnesium to react (s) | | 10 | 2 | 60 | | 10 | 4 | 80 | | 10 | 6 | 100 | | 20 | 2 | 30 | | 40 | 2 | 15 | |
| a Predict how many seconds a piece of magnesium ribbon of 3 cm length would take to react at 10°C. |
| a 70 seconds (1 mark) |
| b Describe what Jane and Jacki would have seen when they placed the magnesium ribbon in the test tube containing acid. |
| b The piece of magnesium would have been covered in bubbles. They may have noticed that the test tube got warmer. Eventually, the piece of magnesium would no longer be visible in the test tube. (2 marks) |
| c Do these results show that the temperature of the solution has an effect on the rate at which the magnesium dissolves? Explain your thinking. |
| c Yes. The reaction took a much shorter time to be completed at higher temperatures. The reaction at 20°C was faster than at 10°C; the reaction at 40°C was even faster. (2 marks) |
| d What could Jane and Jacki have done to make the reaction between the magnesium and the ribbon go even faster? |
| d They could have cut the magnesium into little pieces (1 mark). |

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|  | /6 marks |
|  | **Section III total marks:**  /6 marks |