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|  | |  |  | | --- | --- | | **Gateway Chemistry A (9-1)**  Particles AO1  Paul Weston | **C:\assets\img\ocr_design\cover_logo.png** | | OCR ExamBuilder process constraints mean you may see slight differences between this paper and the original.  Candidates answer on the Question Paper. A calculator may be used in this paper.  **OCR supplied materials:** Additional resources may be supplied with this paper.  **Other materials required:** •   Pencil •   Ruler (cm/mm) | **Duration:** Not set | |  | | |  |

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| Candidate forename |  | Candidate surname |  |

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| Centre number |  |  |  |  |  | Candidate number |  |  |  |  |

## INSTRUCTIONS TO CANDIDATES

•   Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.  
•   Use black ink. HB pencil may be used for graphs and diagrams only.  
•   Answer **all** the questions.  
•   Read each question carefully. Make sure you know what you have to do before starting your answer.  
•   Where space is provided below the question, please write your answer there.  
•   You may use additional paper, or a specific Answer sheet if one is provided, but you must clearly show your candidate number, centre number and question number(s).

## INFORMATION FOR CANDIDATES

•   The quality of written communication is assessed in questions marked with a pencil or an asterisk.  
•   The number of marks is given in brackets **[ ]** at the end of each question or part question.  
•   The total number of marks for this paper is **22**.

Answer **all** the questions.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | |  |  | | **1.** | What is the best description of the particles in a liquid?   |  |  |  | | --- | --- | --- | |  | **Distance between particles** | **Movement of particles** | | **A** | close together | in continuous random motion | | **B** | close together | vibrating about a fixed point | | **C** | far apart | in continuous random motion | | **D** | far apart | vibrating about a fixed point |   Your answer  C:\core\files\questions\1482349077\J248ChemistryAJ248-01NewSAM\img\p2_01_150.png  **[1]** | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | |  |  | | **2.** | Complete the table below to give information about protons, neutrons and electrons.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  |  | | --- | --- | --- | |  | **Charge** | **Mass in atomic mass units** | | proton | .......................... | 1 | | neutron | .......................... | ................ | | electron | negative | ................ | |  |   **[2]** | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | |  |  | | **3(a).** | The table shows the electronic structures of the atoms of some elements.   |  |  |  | | --- | --- | --- | | **Element** | **Symbol** | **Electronic structure** | | helium | He | 2 | | oxygen | O | 2.6 | | neon | Ne | 2.8 | | magnesium | Mg | 2.8.2 | | chlorine | C*l* | 2.8.7 | | calcium | Ca | 2.8.8.2 |   How many **electrons** are there in one atom of chlorine?  **[1]** | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  |  | | --- | --- | |  |  | | **(b).** | What is the **atomic number** of magnesium?  **[1]** | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | |  |  | | **4.** | What is the best description of the particles in a liquid?   |  |  |  | | --- | --- | --- | |  | **Distance between particles** | **Movement of particles** | | **A** | close together | in continuous random motion | | **B** | close together | vibrating about a fixed point | | **C** | far apart | in continuous random motion | | **D** | far apart | vibrating about a fixed point |   Your answer C:\core\files\questions\1482242542\J248ChemistryAJ248-03NewSAM\img\p02_01_150.png  **[1]** | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | |  |  | | **5(a).** | Look at the table. It shows information about some atoms and ions.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Particle** | **Atomic number** | **Mass number** | **Number of protons** | **Number of neutrons** | **Number of electrons** | **Electronic structure** | | **A** | 11 | 23 | 11 | .............. | 11 | 2.8.1 | | **B** | 9 | 19 | 9 | 10 | 9 | ............... | | **C** | ............. | 37 | 17 | ............. | 17 | 2.8.7 | | **D** | 13 | 27 | ............ | ............. | 10 | 2.8 |   **Complete** the table.  **[4]** | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  |  | | --- | --- | |  |  | | **(b).** | Particle **A** is a metal **atom**, particle **D** is an **ion**.  Explain why.      **[2]** | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  |  | | --- | --- | |  |  | | **(c).** | Particle **C** has the electronic structure 2.8.7.  What does this tell you about the position of particle **C** in the Periodic Table?  Explain your answer.        **[4]** | | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  |  | | --- | --- | |  |  | | **6(a).** | Atoms contain electrons, neutrons and protons.  Look at the table. It shows the number of electrons, neutrons and protons in some atoms and ions.  C:\core\files\questions\1488544092\J264GatewayChemistryBB742-022013Jun\img\p2_01_150.png  Complete the table.  **[2]** | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  |  | | --- | --- | |  |  | | **(b).** | In 1808, a scientist named Dalton published his atomic theory.  About a century later, a scientist called Rutherford published another atomic theory.  Why is it important that scientists publish their theories?      **[2]** | | |

**END OF QUESTION PAPER**

# Mark scheme

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Question** | | | **Answer/Indicative content** | **Marks** | **Guidance** |
| 1 |  |  | A | 1 |  |
|  |  |  | **Total** | **1** |  |
| 2 |  |  | C:\core\files\questions\adminupload\70968\p16_02a_150.png | 2 | one mark scored for each correct column (2)   **ALLOW** 1/1760 or 1/1836 or 1/2000 |
|  |  |  | **Total** | **4** |  |
| 3 | a |  | 17 (1) | 1 | **Examiner's Comments**  Many correct answers. A few candidates repeated the electronic structure of the elements. |
|  | b |  | 12 (1) | 1 | **Examiner's Comments**  Many correct answers. A few candidates repeated the electronic structure of the elements. |
|  |  |  | **Total** | **2** |  |
| 4 |  |  | A | 1 |  |
|  |  |  | **Total** | **1** |  |
| 5 | a |  | C:\core\files\questions\1482242542\J248ChemistryAJ248-03NewSAM\img\p09_01a_150.png | 4 | one mark scored for each correct line |
|  | b |  | particle A – one electron in outer shell or energy level (1) particle D – has more protons than electrons (1) | 2 |  |
|  | c |  | group 7 (1) as 7 electrons in outer shell (1) period 3 (1) as 3 shells occupied (1) | 4 |  |
|  |  |  | **Total** | **10** |  |
| 6 | a |  | C:\core\files\questions\1488544092\J264GatewayChemistryBB742-022013Jun\img\p3_01aa_150.png(1)  18 electrons (1) | 2 | C:\core\files\questions\1488544092\J264GatewayChemistryBB742-022013Jun\img\p3_01a_150.png  **allow** 32P  **not** 32P   **Examiner's Comments**  A small but significant proportion of the candidates left this question blank. Candidates often gave the element as sulfur rather than phosphorus and the number of electrons as 16 rather than 18. |
|  | b |  | **any two from:**  so results can be replicated / so work does not need to be duplicated (1)  so further evidence can be collected (1)  idea of peer review / work can be checked (1)  to provide information to other scientists or public or other organisations / AW (1)    so he can get recognition for his work (1) | 2 | allow work can be developed further (1)  allow so work can be evaluated (1)   allow idea that information can be used by other scientists (1) allow idea of to increase the sum of human knowledge / to educate people (1)  allow so other scientists cannot take credit (1)   **Examiner's Comments**  Candidates often appreciated that scientists publish their results so that their work could be checked. Candidates rarely used the term peer review but often described this in words. Candidates who were awarded two marks often went on to describe the idea of developing the scientific work or collecting more evidence. |
|  |  |  | **Total** | **4** |  |