| **Year 11 ATAR CHEMISTRY Name:** |
| --- |

| Task No: | 4 |
| --- | --- |
| Task Type: | Test |
| Content: | The Periodic Table; Classifying and separating substances; Metallic, ionic and covalent structure and bonding |
| Task Description: | Complete the attached questions on the multiple choice answer sheet or in the spaces provided.  Marks will be awarded for presentation and working.  **Test conditions (50 minutes).**  *Formulae and data booklet provided.*  *Non-programmable calculator permitted.* |
| Total Marks: | 36 |
| Weighting: | 2.15% |
| Due Date: |  |



**IMPORTANT NOTE TO CANDIDATES**

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

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**Multiple Choice Answer Sheet**

**Task Number: \_\_ Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Year: \_\_**

**Multiple Choice – 20 questions.**

Circle your choice. If you change your mind, scrub your choice out and circle the one you want. If it is messy, clearly write your choice next to question.

1. A B C D 11. A B C D

2. A B C D 12. A B C D

3. A B C D 13. A B C D

4. A B C D 14. A B C D

5. A B C D 15. A B C D

6. A B C D 16. A B C D

7. A B C D 17. A B C D

8. A B C D 18. A B C D

9. A B C D 19. A B C D

10. A B C D 20. A B C D

**Section 1: Multiple Choice**

*Indicate your answers on the multiple choice answer sheet*

1. ‘Ionisation energy’ refers to
2. the amount of energy required to form a positive or negative ion.
3. the amount of energy required to add an electron to an atom in the gaseous phase.
4. the amount of energy required to remove the most loosely bound electron from an atom.
5. the amount of energy released when a positive or negative ion is formed.
6. Which one of the following best accounts for the *general* increase in ionisation energy across a row of the periodic table?
7. The decreasing distance between the nucleus and the outer electrons in the atoms of the elements across a row
8. The increasing nuclear charge within the atoms of the elements across a row
9. The increasing number of electrons in the atoms of the elements across a row
10. The increasing number of neutrons in the atoms of the elements across a row
11. Which one of the following statements is FALSE?
12. Elements that have few valence electrons tend to have low ionisation energies.
13. Noble gases all have high ionisation energies.
14. *Generally*, as the number of valence electrons increases across a row in the periodic table, so too does ionisation energy.
15. It requires more energy to remove an electron from a p orbital than from an s orbital, as illustrated by the ionisation energies of magnesium and aluminium.
16. Which of the following has the greatest effect on the size of an atom?
17. The number of protons in its atoms
18. The number of neutrons in its atoms
19. The size of the nucleus of its atoms
20. The number of electrons in its atoms
21. Which of the following atoms is the most electronegative?
22. calcium
23. barium
24. potassium
25. magnesium
26. Which of the following has the smallest first ionisation energy?
27. lithium
28. sodium
29. fluorine
30. chlorine
31. Which of the following elements contains atoms in which only three subshells or sublevels are occupied by electrons in the ground state?
32. lithium
33. neon
34. sodium
35. aluminium
36. Which of the following best describes metal atoms?
37. vacant outer shell orbitals and low ionisation energies
38. vacant outer shell orbitals and high ionisation energies
39. filled outer shell orbitals and low ionisation energies
40. filled outer shell orbitals and high ionisation energies
41. Which of the following is NOT an example of a homogeneous substance?
42. carbon dioxide gas
43. a solution of copper(II ) sulfate
44. air
45. a mixture of oil and water
46. Which of the following contains only pure substances?
47. Sodium chloride, oxygen gas, carbon dioxide
48. Sodium chloride solution, oxygen gas, water
49. Sodium chloride, air, water
50. Sodium chloride, nitrogen gas, air
51. A student is required to separate a mixture of chalk dust and icing sugar. Which of the following procedures would best allow the separation and retention of both components of the mixture?
52. addition of water, decantation, filtration
53. addition of water, filtration, crystallisation
54. addition of water, distillation
55. addition of water, decantation, distillation
56. When a solution of lead nitrate is added to a solution of sodium iodide, an insoluble yellow precipitate of lead iodide is formed. Of the following the BEST way of separating the lead iodide from the solution would be
57. evaporation and crystallisation
58. distillation.
59. filtration.
60. decantation.
61. Which of the following properties is most important for separating substances by distillation?
62. solubility
63. particle size
64. boiling point
65. density

*The next 3 questions refer to the table below which show some elements in the main groups of the Periodic Table. (Note, Transition metals have been deleted in this table.). Some of the elements have been given numbers rather than symbols.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| I | II | III | IV | V | VI | VII | VIII |
| Li |  | B |  |  | O | F | Ne |
| 1 | 3 |  |  |  | 5 | 6 |  |
| 2 | 4 |  |  |  |  |  |  |

1. Which elements would you expect to form ionic bonds?
2. 1 and 3.
3. 4 and 6
4. 5 and 6
5. Li and 3
6. Elements which contain metallic bonds only are
7. 1, 5 and 6
8. 5 and 6
9. Ne, 5 and 6
10. 1, 2, 3 and 4
11. Which elements are made up of molecules in which covalent bonds are present?
12. 1 and 2
13. 3 and 4
14. 5 and 6
15. 5, 6 and Ne
16. An unknown compound is a waxy solid, a poor conductor and melts at just above room temperature. It is most likely
17. a covalent molecular compound
18. an ionic compound
19. a covalent network
20. a metal
21. A compound containing a group fifteen element and a group seventeen element would display
22. metallic bonding.
23. covalent molecular bonding.
24. covalent network bonding.
25. ionic bonding.
26. Silicon dioxide occurs widely in the Earth’s crust in the form of mineral quartz. The structure and bonding of solid silicon dioxide at room temperature is best described as
27. a network lattice of Si2+ and O2**-** ions held together by strong covalent bonds.
28. a network lattice of Si and O atoms held together by strong covalent bonds.
29. a layer lattice consisting of hexagonal sheets of atoms covalently bonded together with dispersion forces between layers.
30. a lattice of SiO2 molecules with strong dispersion forces within molecules and weak covalent bonds between molecules.
31. Which of the following exists as discrete molecules in the solid state?
32. carbon dioxide
33. aluminium
34. lithium chloride
35. carbon

**Section 2: Short Answer**

*Write your answer in the spaces provided*

1. Draw electron dot diagrams for the following (4 marks)
2. Mg
3. CaCl2
4. HCN
5. Na3PO4
6. Explain why metals are malleable and ductile. (4 marks)
7. Describe and explain the trend for atomic radii across periods and down groups. (5 marks)
8. Explain why ionic solids are electrical insulators but ionic solutions are electrical conductors.

(3 marks)

**END OF TEST**