2.2 Atomic Structure, Isotopes and Relative Atomic Mass: Test Pack

Total Marks

EDEXCEL 4CH1 · Calculator allowed · about 15 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State the charge of a proton, as used when describing atomic structure in chemistry.

(Total for Question 1 is 1 mark)

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2 Give the shell configuration of an atom with 15 electrons, using comma-separated numbers.

(Total for Question 2 is 1 mark)

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3 Complete the electronic structure for chlorine, element number 17, as used when practising shell notation for the first 20 elements. Write the filled shells as numbers separated by commas.

(Total for Question 3 is 1 mark)

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4 An ion has 13 protons and 10 electrons. State its charge and explain how the particle counts give this charge.

(Total for Question 4 is 2 marks)

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5 A neutral atom is written 27 13 Al. Deduce its protons, neutrons and electrons, showing how the nuclide numbers are used.

(Total for Question 5 is 3 marks)

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6 A synthetic sample has isotope masses 24, 25 and 26 with abundances 25%, 50% and 25%. Calculate its relative atomic mass to 2 decimal places, showing your working. State the percentage of atoms with an isotope mass greater than the calculated mean.

(Total for Question 6 is 3 marks)

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Mark scheme · 2.2 Atomic Structure, Isotopes and Relative Atomic Mass: Test Pack

Question 1

positive (+1) charge **B1**

Answer: +1 (positive)

Question 2

2,8,5 **B1**

Answer: 2,8,5

Question 3

2,8,7 **B1**

Answer: 2,8,7

Question 4

charge = 3+ **B1**

explains that protons each have charge +1 and electrons each have charge -1, so 13 - 10 = +3 **B1**

Answer: 3+ charge: 13 positive proton charges and 10 negative electron charges give 13 - 10 = +3.

Question 5

protons = atomic number = 13 **B1**

neutrons = 27 - 13 = 14 **B1**

electrons = 13 because a neutral atom has equal numbers of protons and electrons **B1**

Answer: Protons = atomic number = 13; neutrons = mass number - atomic number = 27 - 13 = 14; electrons = 13 because the atom is neutral and has equal numbers of protons and electrons.

Question 6

uses the weighted mean (24 x 25 + 25 x 50 + 26 x 25) / 100, or equivalent **M1**

Ar = 25.00 to 2 decimal places **A1**

25% of the atoms have isotope mass greater than the mean (isotope mass 26 only) **B1**

Answer: Ar = (24 x 25 + 25 x 50 + 26 x 25) / 100 = 25.00; atoms heavier than the mean = 25%.

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