AQA GCSE Chemistry

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	Niels Bohr—electrons orbit the nucleus at James Chadwick—the nucleus contains neutrons		1 1	AO1 4.1.1.3
01.2	any six from: • alpha particles/helium nucleus fired at gold foil • Most passed through the gold foil • So most of the atom is empty space • a small number bounced back • so must have collided with something/mass/nucleus • a small number passed through but were deflected/changed direction • positively-charged alpha particles passed near positively charged nucleus and were repelled		6	AO1 4.1.1.3
01.3	19		1	AO2 4.1.1.4
02.1	fractional distillation	do not accept distillation or simple distillation	1	AO2 4.1.1.2

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02.2	mixture is heated both liquids will give off vapours before their boiling point vapours enter fractionating column (with glass beads) water will condense on glass beads as it has a higher boiling point (than isopropanol) isopropanol will continue to rise and pass into condenser will then condense and can be collected in separate vessel		1 1 1 1 1 1	AO1 4.1.1.2
02.3	boiling point too similar		1	AO2 4.1.1.2
03.1	similarities: • both suggest that atoms are spherical • both suggest different elements have different atoms of different masses differences: • earlier model states that atoms cannot be divided • plum pudding suggests that negative electrons are embedded in a ball of positive charge	award 1 mark per point	3	AO1 4.1.1.3
03.2	**Level 3:** A detailed and coherent explanation is given. All three observations of the experimental evidence are explained.		5–6	AO1 4.1.1.3
	Level 2: A coherent explanation is given, but not all observations are linked to aspects of the model.		3–4	
	Level 1: Some correct points are made. At least tone observation is given and linked to aspects of the model.		1–2	

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Question	Answers	Extra information	Mark	AO / Specification reference
	No relevant content		0	
	Indicative content • positively-charged alpha particles fired at gold foil • most alpha particles travelled straight through the foil • suggesting most of the atom is empty space • a small number of alpha particles bounced back • suggesting mass of the atom was concentrated in the centre of the atom • a small number of alpha particles were deflected • suggested the central mass had positive charge • the positively-charged nucleus repelled positive alpha particles, causing the deflection allow answer in terms of plum pudding model, for example, alpha particles would not have passed through if plum pudding model is correct etc.			
04.1	16		1	AO2 4.1.1.4
04.2	17		1	AO2 4.1.1.4
04.3	Y		1	AO3 4.1.1.5
04.4	X and Z	both required for the mark	1	AO3 4.1.1.5
05.1	17	accept same number of electrons	1	AO1 4.1.1.4

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Question	Answers	Extra information	Mark	AO / Specification reference
05.2	17		1	AO1 4.1.1.4
05.3	chlorine has (two) isotopes with different abundance relative atomic mass is an average	students do not need to list the isotopes of chlorine to gain mark accept calculation for 2 marks	1 1	AO1 4.1.1.5
05.4	$\frac{(62.9\times 63)+(30.8\times 65)}{100}$ = 63.616 = 63.6		1 1 1	AO2 4.1.1.6
05.5	other isotopes of copper exist		1	AO3 4.1.1.6
06.1	number of protons = number of electrons = 11 mass number = number of protons + number of neutrons = 11 + 12 = 23		1 1	AO2×1 AO3×1 4.1.1.5

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Question	Answers	Extra information	Mark	AO / Specification reference
06.2	in both atoms, the electrons are arranged in shells/energy levels in both atoms, there are three shells/energy levels in both atoms, the shell/energy level nearest the nucleus has two electrons/is full in both atoms, the shell/energy level second from the nucleus has eight electrons/is full in sodium, the outer shell/energy level has one electron only and is not full in argon, the outer shell/energy level has eight electrons and is full		1 1 1 1 1 1	AO2 4.1.1.7
06.3	$\frac{71}{10\,000} = 0.0071$ 7.1×10^{-3} (pm)		1 1	AO2 4.1.1.5
07.1	mass numbers: L = 14 + 14 = 28 M = 14 + 15 = 29 N = 14 + 16 = 30 percentage abundance of N = 100 – (92.2 + 4.68) = 3.12% relative atomic mass = $\frac{(92.20\times28)+(4.68\times29)+(3.12\times30)}{100}$ =28.1092 = 28.1		1 1 1 1 1	AO1×2 AO2×3 4.1.1.6

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Question	Answers	Extra information	Mark	AO / Specification reference
07.2	three shells two electrons in first shell, eight electrons in second shell, and four electrons in third shell	accept one shell shown with four electrons for 1 mark	1 1	AO1 4.1.1.7
07.3	both isotopes will have the same chemical properties as they have the same number of (outer) electrons		1 1	AO1 4.1.1.5
08.1	−1	any units given negate mark	1	AO1 4.1.1.4
08.2	two crosses in shell nearest centre eight crosses in next shell four crosses in outer shell	accept dots for electrons all electrons must be drawn with the same shape	1	AO2 4.1.1.7
08.3	(Niels) Bohr		1	AO1 4.1.1.3
09.1	atoms of the same element/with the same atomic number/same number of protons but a different number of neutrons		1	AO1 4.1.1.5
09.2	The three isotopes have the same atomic number.		1	AO1 4.1.1.5
09.3	$\frac{(79.0\times24)+(10.0\times25)+(11.0\times26)}{100}$ = 24.32 = 24.3		1 1 1	AO2 4.1.1.6

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10.1	zirconium		1	AO2 4.1.1.4
10.2	calcium		1	AO2 4.1.1.5
10.3	2.8.8.2	accept 2,8,8,2	1	AO2 4.1.1.7
10.4 10.5	award 1 mark for every two points plotted correctly award 1 mark for correct line of best fit		3 1	AO2×3 AO3×1 4.1.1.5
10.6	as the number of protons increases, so does the number of neutrons not directly proportional (as the number of protons increases, the number of neutrons increases more quickly)	 accept not linear/ non-linear	1 1	AO3 4.1.1.5
11.1	triangle	accept drawn symbol do not accept water	1	AO2 4.1.1.1
11.2	A		1	AO2 4.1.1.1
11.3	C		1	AO2 4.1.1.1 4.1.1.2

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11.4	D		1	AO2 4.1.1.1 4.1.1.2
11.5	NaCl	must have capitalisation shown accept ClNa	1	AO2 4.1.1.1
12.1	silicon atoms have more electron shells		1	AO3 4.1.1.7
12.2	1.22×10^{-10} (m)		1	AO2 4.1.1.5
12.3	Si : C 0.111 : 0.077 $\frac{0.111}{0.077} : \frac{0.077}{0.077}$ 1.5 : 1 3 : 2		1 1 1	AO2 4.1.1.5
12.4	0.077 nm = 7.7×10^{-11} m $\frac{7.7\times10^{-11}}{2.7\times10^{-15}}$ = 28 519	accept answer gained from converting metres to nm	1 1	AO1×1 AO2×1 4.1.1.5
13.1	filtration		1	AO1 4.1.1.2
13.2	**Level 3:** A full description of the method provided, with at least two pieces of equipment named.		5–6	AO1

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Question	Answers	Extra information	Mark	AO / Specification reference
	Level 2: Basic method provided, identifying that the water needs to evaporate (either by heating or by being left). At least one piece of equipment identified.		3–4	4.1.1.2
	Level 1: Method identifies idea that water needs to evaporate/be heated. No equipment named.		1–2	
	No relevant content		0	
	Indicative content • mixture placed in evaporating dish • evaporating dish placed on beaker half full of water • place beaker/evaporating dish on tripod and gauze • heat the mixture/water • using Bunsen burner • until crystals start to form • remove mixture from the heat • leave for the rest of the water to evaporate			
13.3	chromatography		1	AO1 4.1.1.2
14.1	A		1	AO2 4.1.1.2
14.2	dyes B and C produced spots that overlap with dye A and each other therefore cannot distinguish whether dye B or C produces the top spot		1 1	AO3 4.1.1.2

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14.3	rerun experiment with difference mobile phase/solvent		1	AO3 4.1.1.2

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