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Chapter 1

Atoms, molecules and stoichiometry

1.1 Relative masses of atoms and molecules

1. 9701_w20_qp_11 Q: 1

Which statement is correct?

- A Cl has a relative isotopic mass of 35.5.
 - B Cl_2 has a relative molecular mass of 70.
 - C ICl has a relative molecular mass of 162.4.
 - D $NaCl$ has a relative molecular mass of 58.5.
-

1.2 The mole and the Avogadro constant

2. 9701_s20_qp_11 Q: 11

A sample of solid ammonium chloride decomposes on heating.



A total of 2.4×10^{21} molecules of gas is formed.

How many hydrogen atoms are present in the gaseous products?

- A** 1.2×10^{21} **B** 2.4×10^{21} **C** 4.8×10^{21} **D** 9.6×10^{21}
-

3. 9701_w19_qp_11 Q: 2

Diamond is a pure form of carbon. The mass of a diamond can be measured in carats. One carat is 0.200 g of carbon.

Which expression gives the number of carats that contain 6.02×10^{23} carbon atoms?

A 0.200×12.0

B $\frac{0.200}{12.0}$

C $\frac{12.0}{0.200}$

D $\frac{0.200}{6.02 \times 10^{23}} \times 12.0$

4. 9701_s17_qp_11 Q: 3

A sports medal has a total surface area of 150 cm^2 . It was evenly coated with silver by electrolysis. Its mass increased by 0.216 g.

How many atoms of silver were deposited per cm^2 on the surface of the medal?

A 8.0×10^{18}

B 1.8×10^{19}

C 8.7×10^{20}

D 1.2×10^{21}

5. 9701_s17_qp_12 Q: 2

Which would contain 9.03×10^{23} oxygen atoms?

A 0.25 mol aluminium oxide

B 0.75 mol sulfur dioxide

C 1.5 mol sulfur trioxide

D 3.0 mol water

1.3 The determination of relative atomic masses, Ar

6. 9701_s20_qp_13 Q: 7

The element sulfur produces a mass spectrum with the following peaks.

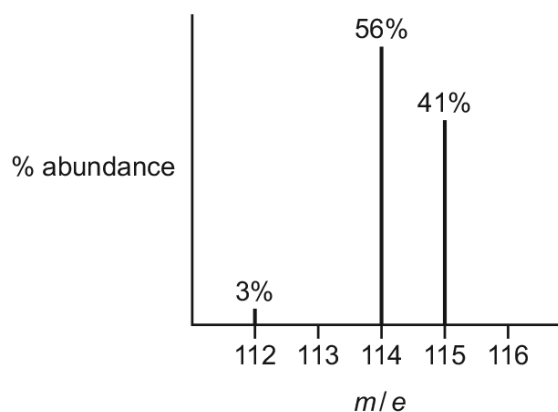
m/e value of peak	relative abundance
32	95.02
33	0.76
34	4.20
36	0.02

Which relative atomic mass of sulfur can be calculated from these data, given to four significant figures?

- A** 32.07 **B** 32.08 **C** 32.09 **D** 32.10

7. 9701_s19_qp_11 Q: 2

A sample of element X is analysed using mass spectrometry. The mass spectrum obtained is shown.



What is the relative atomic mass of this sample of element X?

- A** 113.7 **B** 114.0 **C** 114.2 **D** 114.4

8. 9701_s19_qp_12 Q: 2

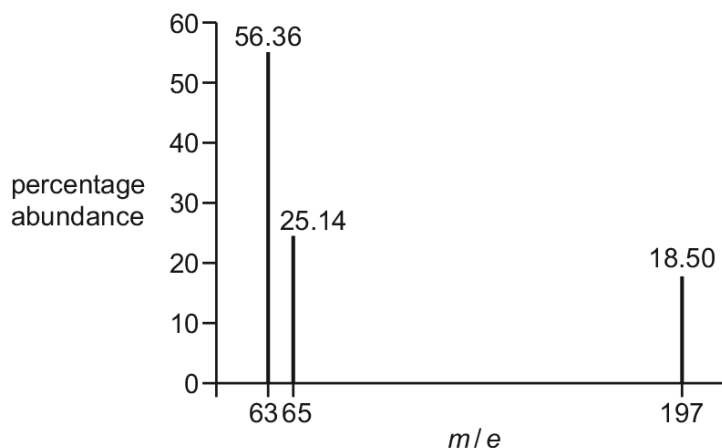
Oxygen has three stable isotopes, ^{16}O , ^{17}O and ^{18}O . All three isotopes are present in a sample of oxygen gas, O_2 , which was analysed using a mass spectrometer.

How many peaks associated with the O_2^+ ion would be expected?

- A** 3 **B** 5 **C** 6 **D** 9
-

9. 9701_s19_qp_13 Q: 2

The mass spectrum of an alloy of copper and gold is shown.



Which expression can be used to calculate the relative atomic mass, A_r , of copper present in this sample?

- A** $\frac{(56.36 \times 63) + (25.14 \times 65)}{(56.36 + 25.14 + 18.50)}$
- B** $\frac{(56.36 \times 63) + (25.14 \times 65) + (18.50 \times 197)}{(56.36 + 25.14 + 18.50)}$
- C** $\frac{(56.36 \times 63) + (25.14 \times 65)}{(56.36 + 25.14)}$
- D** $\frac{(56.36 \times 63) + (25.14 \times 65)}{(63 + 65)}$

10. 9701_s17_qp_11 Q: 2

The mass spectrum of a sample of lithium shows that it contains two isotopes, ${}^6\text{Li}$ and ${}^7\text{Li}$.

The isotopic abundances are shown in the table.

isotope	isotopic abundance
${}^6\text{Li}$	7.42%
${}^7\text{Li}$	92.58%

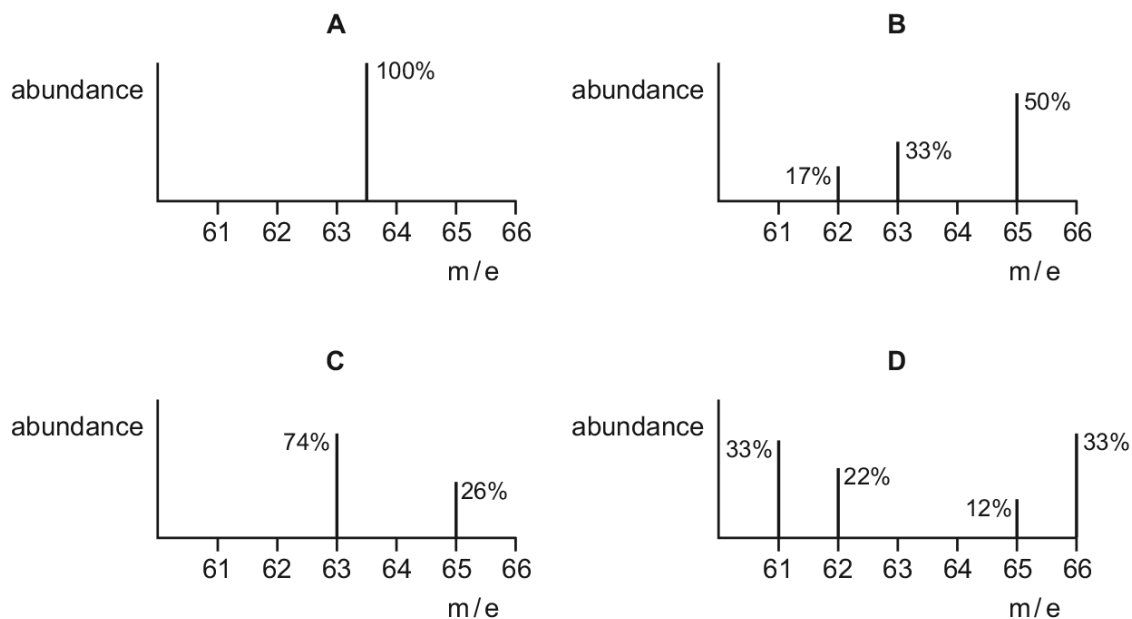
What is the relative atomic mass of this sample of lithium, given to three significant figures?

- A** 6.07 **B** 6.50 **C** 6.90 **D** 6.93

11. 9701_s16_qp_13 Q: 4

The relative atomic mass of copper is 63.5.

Which chart is a correct mass spectrum that would lead to this value?



1.4 The calculation of empirical and molecular formulae

12. 9701_m18_qp_12 Q: 31

Compound Q contains 40% carbon by mass.

What could Q be?

- 1 glucose, $C_6H_{12}O_6$
- 2 starch, $(C_6H_{10}O_5)_n$
- 3 sucrose, $C_{12}H_{22}O_{11}$

13. 9701_s18_qp_12 Q: 4

Compound J burns in excess oxygen to give carbon dioxide and water only. When a 3.00 g sample of compound J is burnt in excess oxygen, 4.40 g of carbon dioxide and 1.80 g of water are formed.

What is the empirical formula of J?

- A** CH **B** CHO **C** CH₂ **D** CH₂O

14. 9701_m17_qp_12 Q: 2

Compounds J and K each contain 40% carbon by mass.

What could J and K be?

	J	K
A	a hexose, $C_6H_{12}O_6$	starch, $(C_6H_{10}O_5)_n$
B	a pentose, $C_5H_{10}O_5$	a hexose, $C_6H_{12}O_6$
C	a pentose, $C_5H_{10}O_5$	sucrose, $C_{12}H_{22}O_{11}$
D	starch, $(C_6H_{10}O_5)_n$	sucrose, $C_{12}H_{22}O_{11}$

15. 9701_w17_qp_11 Q: 1

Which formula represents the empirical formula of a compound?

- A** C_2H_4O **B** $C_2H_4O_2$ **C** C_6H_{12} **D** H_2O_2

16. 9701_w17_qp_12 Q: 2

Two hydrocarbons have the formulae C_WH_X and C_YH_Z . W, X, Y and Z represent different whole numbers.

$$\frac{W}{X} = \frac{Y}{Z}$$

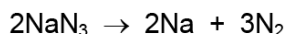
Which row is correct when comparing the two hydrocarbons?

	empirical formula	molecular formula	relative molecular mass
A	different	same	different
B	different	same	same
C	same	different	different
D	same	different	same

1.5 Reacting masses and volumes (of solutions and gases)

17. 9701_m20_qp_12 Q: 7

Sodium azide, NaN_3 , decomposes as shown.



Which volume of nitrogen, measured at room temperature and pressure, will be produced by the decomposition of 150 g of sodium azide?

- A** 166 dm³ **B** 83 dm³ **C** 55 dm³ **D** 37 dm³
-

18. 9701_s20_qp_11 Q: 4

10 cm³ of ethane is burned in 45 cm³ of oxygen at a pressure of 101 kPa and a temperature of 200 °C. Complete combustion takes place.

What is the total volume of gas present when the reaction is complete, measured under the same conditions?

- A** 30 cm³ **B** 50 cm³ **C** 55 cm³ **D** 60 cm³
-

19. 9701_s20_qp_11 Q: 13

6.90 g of an ammonium salt is heated with an excess of aqueous sodium hydroxide. The volume of ammonia produced, measured under room conditions, is 2.51 dm³.

Which ammonium salt is used?

- A** ammonium carbonate ($M_r = 96.0$)
B ammonium chloride ($M_r = 53.5$)
C ammonium nitrate ($M_r = 80.0$)
D ammonium sulfate ($M_r = 132.1$)
-

20. 9701_s20_qp_12 Q: 2

A copper ore contains 3.00% of copper carbonate, CuCO_3 , by mass.

Which mass of copper would be obtained from 1 tonne of the ore?

- A** 1.91 kg **B** 3.71 kg **C** 15.4 kg **D** 58.4 kg
-

21. 9701_s20_qp_12 Q: 6

In this question you should assume air contains 21% oxygen.

What is the minimum volume of air required to ensure complete combustion of 10 cm³ of butane gas, under room conditions?

- A** 14 cm³ **B** 27 cm³ **C** 65 cm³ **D** 310 cm³
-

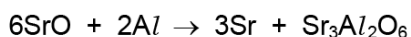
22. 9701_s20_qp_13 Q: 31

Which contain one mole of the underlined substance under room conditions?

- 1 a balloon containing 24.0 dm³ of helium
 - 2 a block of calcium carbonate weighing 100.1 g
 - 3 4000 cm³ of a 0.250 mol dm⁻³ solution of sulfuric acid
-

23. 9701_w20_qp_11 Q: 2

Strontium metal can be extracted from strontium oxide, SrO, by reduction with aluminium. One of the possible reactions is shown.



What is the maximum mass of strontium metal that can be produced from the reduction of 100 g of strontium oxide using this reaction?

- A** 41.3 g **B** 42.3 g **C** 84.6 g **D** 169.2 g
-

24. 9701_w20_qp_12 Q: 2

An ore of manganese contains 4% by mass of MnO₂ and no other manganese compound.

Which mass of manganese would be obtained from 1 tonne of this ore?

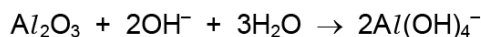
- A** 25.3 kg **B** 40.0 kg **C** 63.3 kg **D** 632 kg
-

25. 9701_w20_qp_12 Q: 5

A white powder is known to be a mixture of magnesium oxide and aluminium oxide.

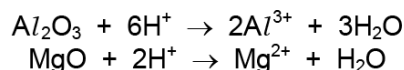
100 cm³ of 2 mol dm⁻³ NaOH(aq) is just enough to dissolve the aluminium oxide in x grams of the mixture.

The reaction is shown.



800 cm³ of 2 mol dm⁻³ HCl(aq) is just enough to dissolve **all** of the oxide in x grams of the mixture.

The reactions are shown.



How many moles of each oxide are present in x grams of the mixture?

	aluminium oxide	magnesium oxide
A	0.05	0.25
B	0.05	0.50
C	0.10	0.25
D	0.10	0.50

26. 9701_m19_qp_12 Q: 2

A 3.7 g sample of copper(II) carbonate is added to 25 cm³ of 2.0 mol dm⁻³ hydrochloric acid.

Which volume of gas is produced under room conditions?

- A** 0.60 dm³ **B** 0.72 dm³ **C** 1.20 dm³ **D** 2.40 dm³

27. 9701_m19_qp_12 Q: 31

In an experiment, 10 cm³ of an organic compound, J, in the gaseous state is reacted with an excess of oxygen. Steam, 20 cm³ of carbon dioxide and 5 cm³ of nitrogen are the only products.

All gas volumes were measured at the same temperature and pressure.

What could be the identity of J?

- 1** C₂H₆N₂
- 2** C₂H₃N
- 3** C₂H₇N

28. 9701_s19_qp_11 Q: 3

A washing powder contains sodium hydrogencarbonate, NaHCO_3 , as one of the ingredients.

In a titration, a solution containing 1.00 g of this washing powder requires 7.15 cm^3 of $0.100 \text{ mol dm}^{-3}$ sulfuric acid for complete reaction. The sodium hydrogencarbonate is the only ingredient that reacts with the acid.

What is the percentage by mass of sodium hydrogencarbonate in the washing powder?

- A** 3.0% **B** 6.0% **C** 12.0% **D** 24.0%
-

29. 9701_s19_qp_12 Q: 31

When O_2 reacts with H_2S the products are SO_2 and H_2O .

Mixture Y contains an equal number of the two molecules shown, and **no other molecules**.



Which statements about Y are correct?

- 1 The average M_r in Y is 34.
 - 2 If some oxygen molecules are removed from Y, the average M_r of the mixture remains the same.
 - 3 When mixture Y is ignited, some H_2S remains unreacted.
-

30. 9701_w19_qp_12 Q: 2

In this question it should be assumed that $(\text{NH}_4)_2\text{CO}_3 \cdot \text{H}_2\text{O}(\text{s})$ dissolves in water without causing an increase in volume.

Which mass of $(\text{NH}_4)_2\text{CO}_3 \cdot \text{H}_2\text{O}(\text{s})$ should be added to 800 cm^3 of water to form a $0.100 \text{ mol dm}^{-3}$ solution of NH_4^+ ions?

- A** 4.56 g **B** 7.13 g **C** 9.12 g **D** 14.3 g
-

31. 9701_w19_qp_12 Q: 9

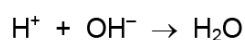
When lead(II) sulfide, PbS, is heated in air, sulfur dioxide and lead(II) oxide are formed.

What is the equation for the reaction between PbS and oxygen?

- A** $\text{PbS} + 2\text{O}_2 \rightarrow \text{SO}_2 + \text{PbO}_2$
B $\text{PbS} + 2\frac{1}{2}\text{O}_2 \rightarrow \text{SO}_3 + \text{PbO}_2$
C $\text{PbS} + 1\frac{1}{2}\text{O}_2 \rightarrow \text{SO}_2 + \text{PbO}$
D $\text{PbS} + 2\text{O}_2 \rightarrow \text{SO}_3 + \text{PbO}$
-

32. 9701_m18_qp_12 Q: 6

Sodium hydroxide neutralises acid.



In a 11000dm^3 sample of an aqueous solution, the concentration of acid, $[\text{H}^+]$, is $1.26 \times 10^{-3}\text{mol dm}^{-3}$.

Which mass of solid sodium hydroxide neutralises the acid?

- A** 0.0214 g **B** 0.0504 g **C** 236 g **D** 554 g
-

33. 9701_s18_qp_11 Q: 31

One mole of sulfuric acid is used to make an aqueous solution. The solution contains H_2SO_4 molecules, H^+ ions, SO_4^{2-} ions and HSO_4^- ions.

Which statements are correct?

- 1** The solution contains 6.02×10^{23} sulfur atoms.
2 The solution contains an exactly equal number of H^+ ions and HSO_4^- ions.
3 One mole of SO_4^{2-} ions contains two moles of electrons.
-

34. 9701_s18_qp_12 Q: 31

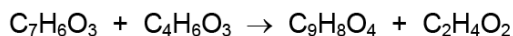
For complete combustion, 1 mol of an organic compound X requires 2.5 mol of O_2 .

Which compounds could be X?

- 1** $\text{C}_2\text{H}_5\text{OH}$
2 C_2H_2
3 CH_3CHO
-

35. 9701_s18_qp_13 Q: 5

Aspirin, $C_9H_8O_4$, $M_r = 180.0$, can be made by a reaction between 2-hydroxybenzoic acid, $C_7H_6O_3$, $M_r = 138.0$, and ethanoic anhydride, $C_4H_6O_3$, $M_r = 102.0$. The balanced equation for the reaction is shown.



If a reaction mixture consists of 10.0 g of each of the two reactants, what is the maximum mass of aspirin that can be produced?

- A** 5.7 g **B** 10.0 g **C** 13.0 g **D** 17.6 g

36. 9701_s18_qp_13 Q: 36

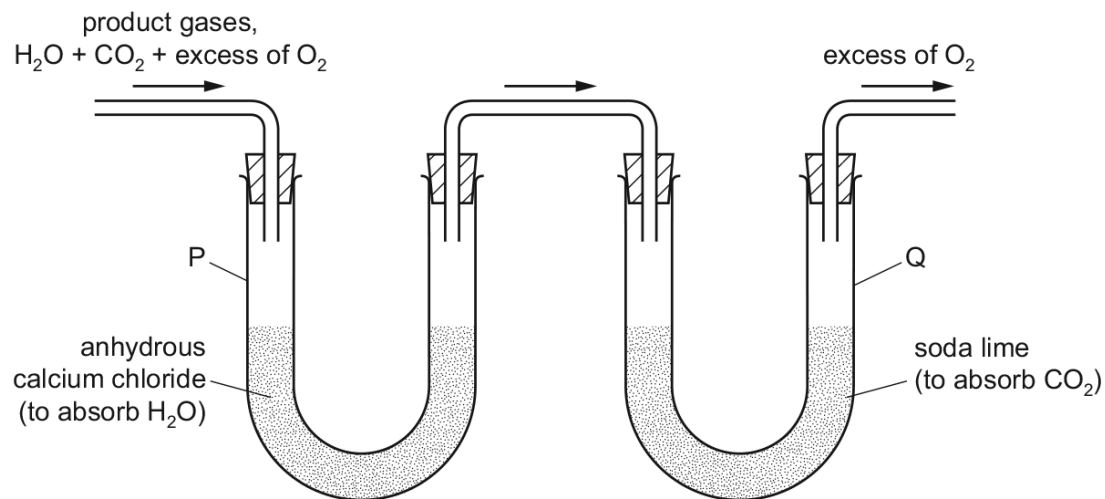
Under room conditions, 600 cm^3 of a gas, X, has a mass of 0.700 g.

What could X be?

- 1** carbon monoxide
2 ethene
3 nitrogen

37. 9701_w18_qp_11 Q: 3

A sample of the hydrocarbon C_6H_{12} is completely burned in dry oxygen and the product gases are collected as shown.



The increases in mass of the collecting vessels P and Q are M_P and M_Q , respectively.

What is the ratio M_P / M_Q ?

- A** 0.41 **B** 0.82 **C** 1.2 **D** 2.4

38. 9701_w18_qp_12 Q: 31

Zinc reacts with hydrochloric acid according to the following equation.



Which statements are correct?

- 1 A 3.27 g sample of zinc reacts with an excess of hydrochloric acid to give 0.0500 mol of zinc chloride.
 - 2 A 6.54 g sample of zinc reacts completely with exactly 100 cm³ of 1.00 mol dm⁻³ hydrochloric acid.
 - 3 A 13.08 g sample of zinc reacts with an excess of hydrochloric acid to give 9.60 dm³ of hydrogen, measured at room conditions.
-

39. 9701_s17_qp_12 Q: 19

A chemist took 2.00 dm³ of nitrogen gas, measured under room conditions, and reacted it with a large volume of hydrogen gas to produce ammonia. Only 15.0% of the nitrogen gas reacted to produce ammonia.

Which mass of ammonia was formed?

- A** 0.213 g **B** 0.425 g **C** 1.42 g **D** 2.83 g
-

40. 9701_s17_qp_13 Q: 2

A 0.216 g sample of an aluminium compound X reacts with an excess of water to produce a single hydrocarbon gas. This gas burns completely in O₂ to form H₂O and CO₂ only. The volume of CO₂ at room temperature and pressure is 108 cm³.

What is the formula of X?

- A** Al₂C₃ **B** Al₃C₂ **C** Al₃C₄ **D** Al₄C₃
-

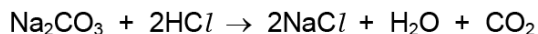
41. 9701_s17_qp_13 Q: 3

Which equation correctly describes the complete combustion of an alkene, C_nH_{2n}?

- A** C_nH_{2n} + $\frac{3}{2}$ nO₂ → nCO₂ + 2nH₂O
- B** C_nH_{2n} + $\frac{3}{2}$ nO₂ → nCO₂ + nH₂O
- C** C_nH_{2n} + 2nO₂ → nCO₂ + nH₂O
- D** C_nH_{2n} + 2nO₂ → nCO₂ + 2nH₂O
-

42. 9701_w17_qp_11 Q: 32

A student makes sodium chloride by reacting together 0.025 mol of sodium carbonate with an excess of 0.2 mol dm⁻³ hydrochloric acid.



Which statements about the quantities of substance are correct?

- 1 600 cm³ of carbon dioxide are produced at room temperature and pressure.
- 2 250 cm³ of the hydrochloric acid are needed to exactly neutralise the sodium carbonate.
- 3 1.46 g of sodium chloride are produced.

43. 9701_w17_qp_12 Q: 3

The airbags in cars contain sodium azide, NaN₃, and an excess of potassium nitrate, KNO₃.

In a car accident, the reactions shown occur, producing nitrogen. This causes the airbag to inflate rapidly.



How many moles of nitrogen gas are produced **in total** when 1 mol of sodium azide, NaN₃, decomposes in an airbag?

- A** 1.5 **B** 1.6 **C** 3.2 **D** 4.0

44. 9701_s16_qp_11 Q: 3

Tetraethyl lead, Pb(C₂H₅)₄, has been used as a petrol additive.

What is the percentage by mass of carbon in tetraethyl lead?

- A** 10.2 **B** 14.9 **C** 29.7 **D** 32.0

45. 9701_s16_qp_12 Q: 4

In China, the concentration of blood glucose, C₆H₁₂O₆, is measured in mmol / l. In Pakistan, the concentration of blood glucose is measured in mg / dl.

The unit l is a litre (1 dm³). The unit dl is a decilitre (0.1 dm³).

A blood glucose concentration of 18.5 mmol / l indicates a health problem.

What is 18.5 mmol / l converted to mg / dl?

- A** 33.3 mg / dl **B** 178 mg / dl **C** 333 mg / dl **D** 3330 mg / dl
-

46. 9701_s16_qp_12 Q: 31

In an experiment, 10 cm^3 of an organic compound, **J**, in the gaseous state was sparked with an excess of oxygen. 20 cm^3 of carbon dioxide and 5 cm^3 of nitrogen were obtained among the products. All gas volumes were measured at the same temperature and pressure.

What could be the identity of **J**?

- 1 $\text{C}_2\text{H}_6\text{N}_2$
 - 2 $\text{C}_2\text{H}_3\text{N}$
 - 3 $\text{C}_2\text{H}_7\text{N}$
-

47. 9701_s16_qp_13 Q: 3

Which mass of urea, $\text{CO}(\text{NH}_2)_2$, contains the same mass of nitrogen as 101.1 g of potassium nitrate?

- A** 22g **B** 30g **C** 44g **D** 60g
-

48. 9701_w16_qp_12 Q: 3

People are advised to eat less than 6.00 g of salt (sodium chloride) per day for health reasons.

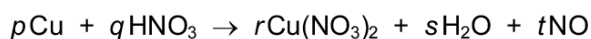
Which mass of sodium is present in 6.00 g of sodium chloride?

- A** 0.261 g **B** 2.36 g **C** 3.64 g **D** 3.88 g
-

49. 9701_w16_qp_12 Q: 4

When copper reacts with a 50% solution of nitric acid, nitrogen monoxide is evolved and a blue solution results.

The balanced equation for this reaction is shown.



What are the values of the integers p , q , r , s and t ?

	p	q	r	s	t
A	1	4	1	2	2
B	2	6	2	3	2
C	2	8	2	4	4
D	3	8	3	4	2

50. 9701_s15_qp_12 Q: 2

The shell of a chicken's egg makes up 5% of the mass of an average egg. An average egg has a mass of 50g.

Assume the egg shell is pure calcium carbonate.

How many complete chicken's egg shells would be needed to neutralise 50cm³ of 2.0 mol dm⁻³ ethanoic acid?

- A** 1 **B** 2 **C** 3 **D** 4

51. 9701_w15_qp_11 Q: 3

Use of the Data Booklet is relevant to this question.

The compound S₂O₇ is hydrolysed by water to produce sulfuric acid and oxygen only.

Which volume of oxygen, measured at room temperature and pressure, is evolved when 0.352g of S₂O₇ is hydrolysed?

- A** 12 cm³ **B** 24 cm³ **C** 48 cm³ **D** 96 cm³

52. 9701_w15_qp_12 Q: 2

Arsenic chloride, AsCl₃, reacts with sodium borohydride, NaBH₄.



What are the numbers **p**, **q**, **r**, **s** and **t** when this equation is balanced correctly?

	p	q	r	s	t
A	2	3	2	3	1
B	3	3	3	3	2
C	4	3	4	3	3
D	4	4	4	4	3

53. 9701_w15_qp_12 Q: 13

Use of the Data Booklet is relevant to this question.

The reaction between aluminium powder and anhydrous barium nitrate is used as the propellant in some fireworks. The metal oxides and nitrogen are the only products.

Which volume of nitrogen, measured under room conditions, is produced when 0.783g of anhydrous barium nitrate reacts with an excess of aluminium?

- A** 46.8 cm³ **B** 72.0 cm³ **C** 93.6 cm³ **D** 144 cm³

SN	Paper	Q. No.	Answer
1	9701_w20_qp_11	1	C
2	9701_s20_qp_11	11	C
3	9701_w19_qp_11	2	C
4	9701_s17_qp_11	3	A
5	9701_s17_qp_12	2	B
6	9701_s20_qp_13	7	C
7	9701_s19_qp_11	2	D
8	9701_s19_qp_12	2	B
9	9701_s19_qp_13	2	C
10	9701_s17_qp_11	2	D
11	9701_s16_qp_13	4	C
12	9701_m18_qp_12	31	D
13	9701_s18_qp_12	4	D
14	9701_m17_qp_12	2	B
15	9701_w17_qp_11	1	A
16	9701_w17_qp_12	2	C
17	9701_m20_qp_12	7	B
18	9701_s20_qp_11	4	D
19	9701_s20_qp_11	13	D
20	9701_s20_qp_12	2	C
21	9701_s20_qp_12	6	D
22	9701_s20_qp_13	31	A
23	9701_w20_qp_11	2	B
24	9701_w20_qp_12	2	A
25	9701_w20_qp_12	5	D
26	9701_m19_qp_12	2	A
27	9701_m19_qp_12	31	C
28	9701_s19_qp_11	3	C
29	9701_s19_qp_12	31	A
30	9701_w19_qp_12	2	A
31	9701_w19_qp_12	9	C
32	9701_m18_qp_12	6	D
33	9701_s18_qp_11	31	D
34	9701_s18_qp_12	31	C
35	9701_s18_qp_13	5	C
36	9701_s18_qp_13	36	A
37	9701_w18_qp_11	3	A
38	9701_w18_qp_12	31	D
39	9701_s17_qp_12	19	B
40	9701_s17_qp_13	2	D
41	9701_s17_qp_13	3	B
42	9701_w17_qp_11	32	B

SN	Paper	Q. No.	Answer
43	9701_w17_qp_12	3	B
44	9701_s16_qp_11	3	C
45	9701_s16_qp_12	4	C
46	9701_s16_qp_12	31	C
47	9701_s16_qp_13	3	B
48	9701_w16_qp_12	3	B
49	9701_w16_qp_12	4	D
50	9701_s15_qp_12	2	B
51	9701_w15_qp_11	3	B
52	9701_w15_qp_12	2	C
53	9701_w15_qp_12	13	B
54	9701_s19_qp_11	31	B
55	9701_m18_qp_12	3	C
56	9701_s18_qp_13	2	D
57	9701_w18_qp_12	2	B
58	9701_s17_qp_11	31	B
59	9701_s17_qp_13	1	A
60	9701_w17_qp_12	31	A
61	9701_m20_qp_12	1	A
62	9701_s20_qp_12	34	A
63	9701_w20_qp_11	3	C
64	9701_w20_qp_12	31	B
65	9701_s19_qp_12	32	D
66	9701_s19_qp_13	31	D
67	9701_s19_qp_13	32	A
68	9701_w19_qp_11	31	A
69	9701_s18_qp_12	32	A
70	9701_s17_qp_12	1	B
71	9701_s17_qp_13	31	C
72	9701_w17_qp_12	1	A
73	9701_m16_qp_12	3	D
74	9701_m16_qp_12	4	D
75	9701_s16_qp_11	4	A
76	9701_s16_qp_11	31	A
77	9701_w16_qp_11	5	C
78	9701_w16_qp_11	31	B
79	9701_s15_qp_11	31	A
80	9701_s15_qp_12	31	D
81	9701_s15_qp_13	31	D
82	9701_w15_qp_12	31	D
83	9701_m20_qp_12	31	C
84	9701_s20_qp_11	3	B