

**CHEMISTRY**

PAPER 1      2017 — 2023

Chapter 1	<b>ATOMS, MOLECULES &amp; STOICHIOMETRY</b>	Page 1
Chapter 2	<b>ATOMIC STRUCTURE</b>	Page 30
Chapter 3	<b>CHEMICAL BONDING</b>	Page 51
Chapter 4	<b>STATES OF MATTER</b>	Page 80
Chapter 5	<b>CHEMICAL ENERGETICS</b>	Page 96
Chapter 6	<b>ELECTROCHEMISTRY</b>	Page 130
Chapter 7	<b>EQUILIBRIA</b>	Page 149
Chapter 8	<b>REACTION KINETICS</b>	Page 180
Chapter 9	<b>THE PERIODIC TABLE : CHEMICAL PERIODICITY</b>	Page 215
Chapter 10	<b>GROUP 2</b>	Page 244
Chapter 11	<b>GROUP 17</b>	Page 282
Chapter 12	<b>AN INTRODUCTION TO THE CHEMISTRY OF TRANSITION ELEMENTS</b>	Page 302
Chapter 13	<b>NITROGEN &amp; SULFUR</b>	Page 306
Chapter 14	<b>AN INTRODUCTION TO ORGANIC CHEMISTRY</b>	Page 323
Chapter 15	<b>HYDROCARBONS</b>	Page 348
Chapter 16	<b>HALOGEN DERIVATIVES</b>	Page 370
Chapter 17	<b>HYDROXY COMPOUNDS</b>	Page 396
Chapter 18	<b>CARBONYL COMPOUNDS</b>	Page 425
Chapter 19	<b>CARBOXYLIC ACIDS AND DERIVATIVES</b>	Page 453
Chapter 20	<b>NITROGEN COMPOUNDS</b>	Page 484
Chapter 21	<b>POLYMERISATION</b>	Page 488
Chapter 22	<b>ANALYTICAL TECHNIQUES</b>	Page 496
Chapter 23	<b>ORGANIC SYNTHESIS</b>	Page 517
	<b>ANSWERS</b>	Page 524



## CHEMISTRY 9701

### TOPICAL PAST PAPER WORKSHEETS

2017 - 2023 | Questions + Mark scheme

#### AVAILABLE PAPERS

**P1**

1473 Questions

**P2**

299 Questions

**P4**

365 Questions

*www.exam-mate.com*

TOPICS	P1	P2	P4
ATOMS, MOLECULES & STOICHIOMETRY	106	18	7
ATOMIC STRUCTURE	66	12	9
CHEMICAL BONDING	94	29	12
STATES OF MATTER	56	11	2
CHEMICAL ENERGETICS	85	29	30
ELECTROCHEMISTRY	58	6	28
EQUILIBRIA	73	17	36
REACTION KINETICS	70	8	26
THE PERIODIC TABLE : CHEMICAL PERIODICITY	84	25	8
GROUP 2	124	23	30
GROUP 17	59	13	0
AN INTRODUCTION TO THE CHEMISTRY OF TRANSITION ELEMENTS	12	1	40
NITROGEN & SULFUR	58	11	2
AN INTRODUCTION TO ORGANIC CHEMISTRY	81	16	11
HYDROCARBONS	60	17	9
HALOGEN DERIVATIVES	68	13	7
HYDROXY COMPOUNDS	79	9	11
CARBONYL COMPOUNDS	76	7	2
CARBOXYLIC ACIDS AND DERIVATIVES	80	7	15
NITROGEN COMPOUNDS	9	0	18
POLYMERISATION	22	6	13
ANALYTICAL TECHNIQUES	37	10	28
ORGANIC SYNTHESIS	16	11	21

1 - (9701/13\_Summer\_2017\_Q1) - Atoms, molecules & Stoichiometry

The ion  $Y^{3-}$  contains 18 electrons and has a mass number of 31.

How many protons and neutrons does  $Y^{3-}$  contain?

	protons	neutrons
A	15	16
B	15	18
C	18	13
D	21	10

2 - (9701/11\_Summer\_2017\_Q2) - Atoms, molecules & Stoichiometry

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

3 - (9701/12\_Summer\_2017\_Q2) - Atoms, molecules & Stoichiometry

Which would contain  $9.03 \times 10^{23}$  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

4 - (9701/13\_Summer\_2017\_Q2) - Atoms, molecules & Stoichiometry

A 0.216g sample of an aluminium compound X reacts with an excess of water to produce a single hydrocarbon gas. This gas burns completely in  $\text{O}_2$  to form  $\text{H}_2\text{O}$  and  $\text{CO}_2$  only. The volume of  $\text{CO}_2$  at room temperature and pressure is  $108\text{ cm}^3$ .

What is the formula of X?

- A  $\text{Al}_2\text{C}_3$       B  $\text{Al}_3\text{C}_2$       C  $\text{Al}_3\text{C}_4$       D  $\text{Al}_4\text{C}_3$

5 - (9701/11\_Summer\_2017\_Q3) - Atoms, molecules & Stoichiometry

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

How many atoms of silver were deposited per  $\text{cm}^2$  on the surface of the medal?

- A  $8.0 \times 10^{18}$       B  $1.8 \times 10^{19}$       C  $8.7 \times 10^{20}$       D  $1.2 \times 10^{21}$

6 - (9701/12\_Summer\_2017\_Q3) - Atoms, molecules & Stoichiometry

In some fireworks there is a reaction between powdered aluminium and powdered barium nitrate. Heat is evolved, an unreactive gas is produced, and all nitrogen atoms are reduced.

What is the equation for this reaction?

- A  $2Al + Ba(NO_3)_2 \rightarrow Al_2O_3 + BaO + 2NO$   
B  $4Al + 4Ba(NO_3)_2 \rightarrow 2Al_2O_3 + 4Ba(NO_2)_2 + O_2$   
C  $10Al + 3Ba(NO_3)_2 \rightarrow 5Al_2O_3 + 3BaO + 3N_2$   
D  $10Al + 18Ba(NO_3)_2 \rightarrow 10Al(NO_3)_3 + 18BaO + 3N_2$

7 - (9701/13\_Summer\_2017\_Q3) - Atoms, molecules & Stoichiometry

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

- A  $C_nH_{2n} + \frac{3}{2}nO_2 \rightarrow nCO_2 + 2nH_2O$   
B  $C_nH_{2n} + \frac{3}{2}nO_2 \rightarrow nCO_2 + nH_2O$   
C  $C_nH_{2n} + 2nO_2 \rightarrow nCO_2 + nH_2O$   
D  $C_nH_{2n} + 2nO_2 \rightarrow nCO_2 + 2nH_2O$

8 - (9701/11\_Winter\_2017\_Q1) - Atoms, molecules & Stoichiometry

Which formula represents the empirical formula of a compound?

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

9 - (9701/12\_Winter\_2017\_Q2) - Atoms, molecules & Stoichiometry

Two hydrocarbons have the formulae  $C_W H_X$  and  $C_Y H_Z$ . W, X, Y and Z represent different whole numbers.

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

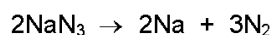
Which row is correct when comparing the two hydrocarbons?

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

10 - (9701/12\_Winter\_2017\_Q3) - Atoms, molecules & Stoichiometry

The airbags in cars contain sodium azide,  $NaN_3$ , and an excess of potassium nitrate,  $KNO_3$ .

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,  $NaN_3$ , decomposes in an airbag?

- A 1.5                      B 1.6                      C 3.2                      D 4.0

11 - (9701/13\_Winter\_2017\_Q5) - Atoms, molecules & Stoichiometry

A fluorescent light tube has an internal volume of  $400 \text{ cm}^3$  and an internal pressure of 200 kPa.

It is filled with 0.03 moles of an ideal gas.

What is the temperature of the gas inside the fluorescent light tube?

- A  $3.21 \times 10^{-1} \text{ K}$   
B  $3.21 \times 10^2 \text{ K}$   
C  $3.21 \times 10^5 \text{ K}$   
D  $3.21 \times 10^8 \text{ K}$

# ANSWERS

[www.exam-prepare.com](http://www.exam-prepare.com)

1 - (9701/13\_Summer\_2017\_Q1) - *Atoms, molecules & Stoichiometry*

A

2 - (9701/11\_Summer\_2017\_Q2) - *Atoms, molecules & Stoichiometry*

D

3 - (9701/12\_Summer\_2017\_Q2) - *Atoms, molecules & Stoichiometry*

B

4 - (9701/13\_Summer\_2017\_Q2) - *Atoms, molecules & Stoichiometry*

D

5 - (9701/11\_Summer\_2017\_Q3) - *Atoms, molecules & Stoichiometry*

A

6 - (9701/12\_Summer\_2017\_Q3) - *Atoms, molecules & Stoichiometry*

C

7 - (9701/13\_Summer\_2017\_Q3) - *Atoms, molecules & Stoichiometry*

B

8 - (9701/11\_Winter\_2017\_Q1) - *Atoms, molecules & Stoichiometry*

A

9 - (9701/12\_Winter\_2017\_Q2) - *Atoms, molecules & Stoichiometry*

C

10 - (9701/12\_Winter\_2017\_Q3) - *Atoms, molecules & Stoichiometry*

B