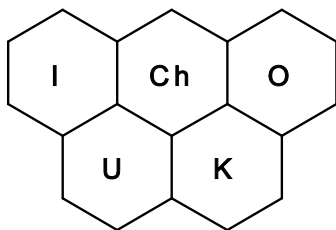




ROYAL SOCIETY
OF CHEMISTRY



ASDAN
China

**57th INTERNATIONAL
CHEMISTRY OLYMPIAD
2025**

UK Round One

STUDENT ANSWER BOOKLET

In order to process your score, we need to store your name, candidate number, centre name, centre number and mark in a database: these details are only viewable by ASDAN and the RSC Chemistry Olympiad Working Group.

Your participation in the competition indicates that you are happy for us to do this.

Please PRINT details clearly and in ENGLISH:

Name

Account Number

Date of birth

School name

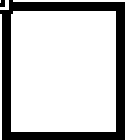
Question	1	2	3	4	5	6	Total
Marks Available	8	9	20	12	19	15	83
Marks Scored							

1.	This question is about clay pigeon shooting	Mark
(a)	(i)	<input type="checkbox"/>
	(ii)	<input type="checkbox"/>
(b)		<input type="checkbox"/>
(c)		<input type="checkbox"/>
(d)		<input type="checkbox"/>
(e)		<input type="checkbox"/>
(f)		<input type="checkbox"/>

(g)



Total out of 8



2.	This question is about BrAt	Mark		
(a)		<input type="checkbox"/>		
(b)		<input type="checkbox"/>		
(c)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">B</td> <td style="width: 50%; text-align: center;">C</td> </tr> </table>	B	C	<input type="checkbox"/>
B	C			
(d)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">x</td> <td style="width: 50%; text-align: center;">y</td> </tr> </table>	x	y	<input type="checkbox"/>
x	y			
(e)		<input type="checkbox"/>		
(f)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">D</td> <td style="width: 50%; text-align: center;">E</td> </tr> </table>	D	E	<input type="checkbox"/> <input type="checkbox"/>
D	E			
(g)		<input type="checkbox"/> <input type="checkbox"/>		
<i>Total out of 9</i>		<input type="checkbox"/>		


3. This question is about epoxides

Mark

(a)



(b)

	60°	90°	104.5°	107°	109.5°	120°	180°
<chem>C2H5OC2H5</chem>							
							



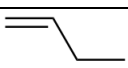
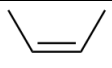
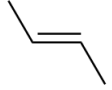

(c)



(d)



(e)

<chem>C4H8</chem> isomer	1	2	3	4
				
				
				
				



(f)	B	C	
	D		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
(g)	[E⁻]	F	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
(h)	G	H	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	I		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

(i)

J

K

Total out of 20

4.	This question is about Raman spectroscopy	Mark
(a)		<input type="checkbox"/>
(b)		<input type="checkbox"/>
(c)	A	<input type="checkbox"/>
(d)	Repeat unit of B	<input type="checkbox"/>

(e)

(i)



(ii)



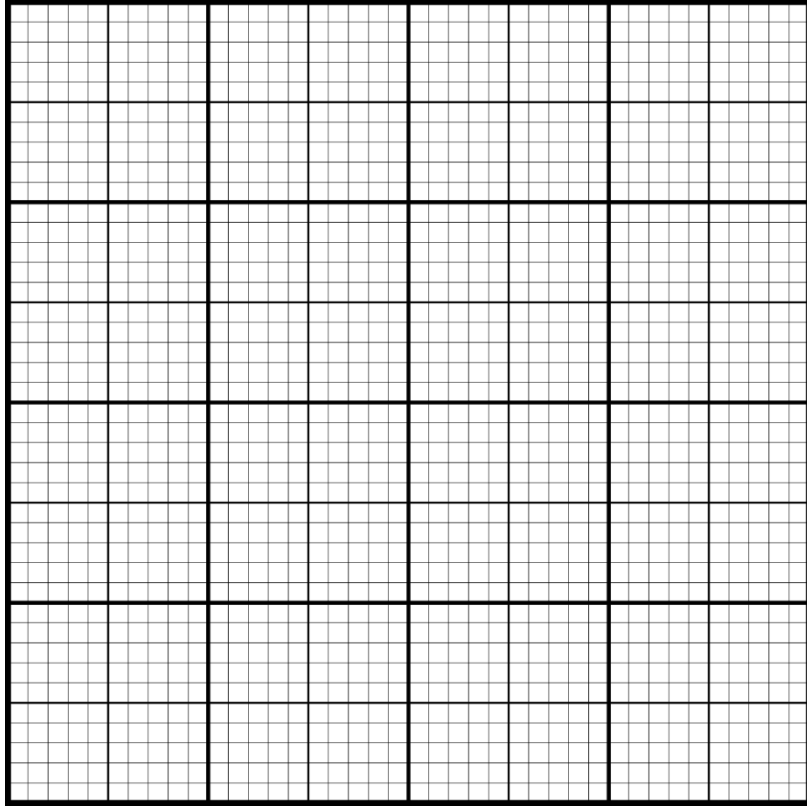
(f)

	C≡C stretch	conjugated C=C stretch	C-H stretch	C-C stretch	O-H stretch
Line 1					
Line 2					



(g)

(i)



Use of graph paper is optional.



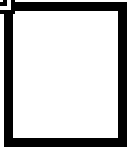
(ii)



(iii)



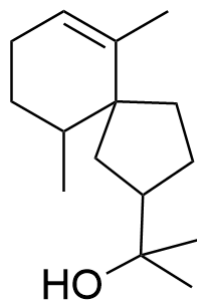
Total out of 12



5. This question is about agarwood

Mark

(a)



(b)

A

B

C

[D]

(c)

E



[F]



G



(d)

H

I

J

K

[L*]

M

Total out of 19

6. This question is about the iodination of ketones

Mark

(a)

A	B	C	I ₂	HI

(b)

(i)

(ii)

(c)

(d)

(e)



(f)

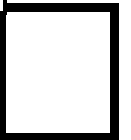
Statement	C	E
Product whose reaction pathway has a larger rate constant for the first step		
Is the major product at high $[I_2]$		
Product whose reaction pathway has a larger K_{eq}		
Is the major product a low $[I_2]$		

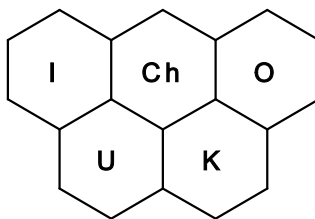


(g)



Total out of 15





Periodic Table and Data Sheet

Physical Constants and Formulae

Avogadro's constant	N_A	$6.022 \times 10^{23} \text{ mol}^{-1}$
molar gas constant	R	$8.314 \text{ J K}^{-1} \text{ mol}^{-1}$
Faraday constant	F	96485 C mol^{-1}
Planck constant	h	$6.626 \times 10^{-34} \text{ m}^2 \text{ kg s}^{-1}$
speed of light in vacuum	c	$2.998 \times 10^8 \text{ m s}^{-1}$
mass of electron	m_e	$9.109 \times 10^{-31} \text{ kg}$
atmospheric pressure	p_{atm}	101325 Pa

$$1 \text{ nm} = 1 \times 10^{-9} \text{ m}$$

$$1 \text{ \AA} = 1 \times 10^{-10} \text{ m}$$

$$1 \text{ pm} = 1 \times 10^{-12} \text{ m}$$

$$0 \text{ }^\circ\text{C} = 273 \text{ K}$$

Ideal gas equation	$pV = nRT$
--------------------	------------

Frequency of light, ν	$\nu = \frac{c}{\lambda}$
---------------------------	---------------------------

IR Absorption data

Bond	Wavenumber / cm^{-1}
N-H	3500-3350
O-H (alcohol)	3600-3200
O-H (acid)	3600-2500
C-H	3300-2840
$\text{C}\equiv\text{N}$	2250
$\text{C}\equiv\text{C}$	2260-2100
$\text{C}=\text{O}$	1780-1680
$\text{C}=\text{C}$	1680-1600
$\text{C}=\text{C}$ (conjugated)	1600-1400
$\text{C}-\text{O}$	1250-1050
$\text{C}-\text{C}$	1100-750

$$\text{volume of cube} = (\text{side length})^3$$

$$\text{volume of sphere} = \frac{4}{3}\pi \times (\text{radius})^3$$

Periodic Table

1 H 1.008																	2 He 4.003
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
19 K 39.102	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.63	33 As 74.92	34 Se 78.97	35 Br 79.904	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.95	43 Tc	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57 La	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og

Lanthanides	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm	62 Sm 150.4	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.05	71 Lu 174.97
Actinides	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr