

Paper Reference(s) 9CH0/01
Pearson Edexcel Level 3 GCE

Chemistry

Advanced

PAPER 1: Advanced Inorganic and Physical Chemistry

Monday 12 June 2023 – Morning

Diagram Booklet

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

INSTRUCTIONS

There may be spare copies of some diagrams in case you need them.

THIS DIAGRAM BOOKLET MUST BE RETURNED WITH THE QUESTION PAPER AT THE END OF THE EXAMINATION.

Contents

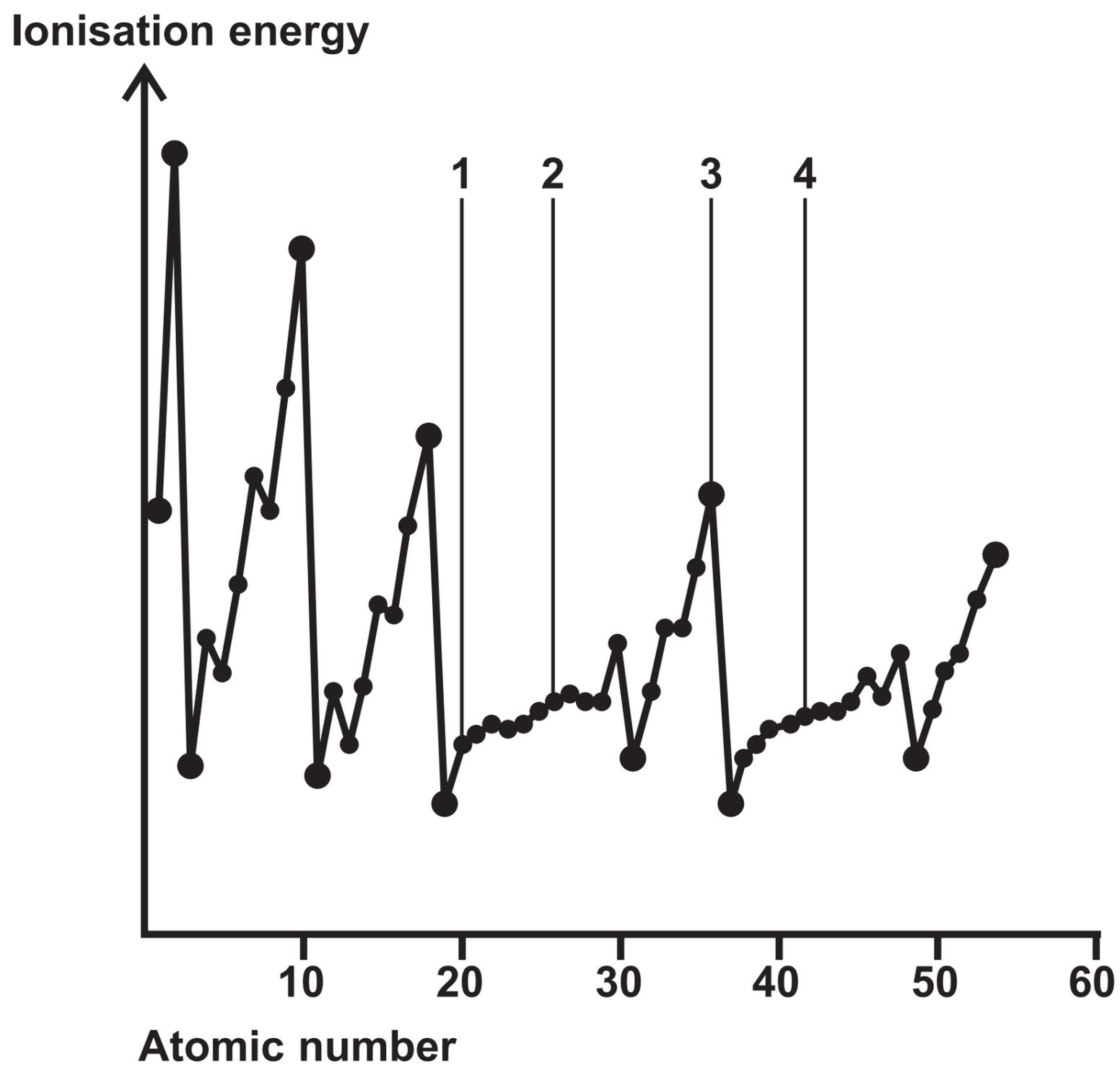
Page

4	Question 1(a)
5	Question 2(b)
6	Question 3(c)
7	Question 4
8	Question 5(a)(i)
9	Question 5(b)
10	Question 6(a)
11	Question 7(b)(ii)
12	Question 7(d)
13	Question 9(a)
14	Question 9(b)
15	Question 10(d)

Spare Copies

16	Question 2(b)
17	Question 5(a)(i)
18	Question 9(a)

Question 1(a)



Question 2(b)

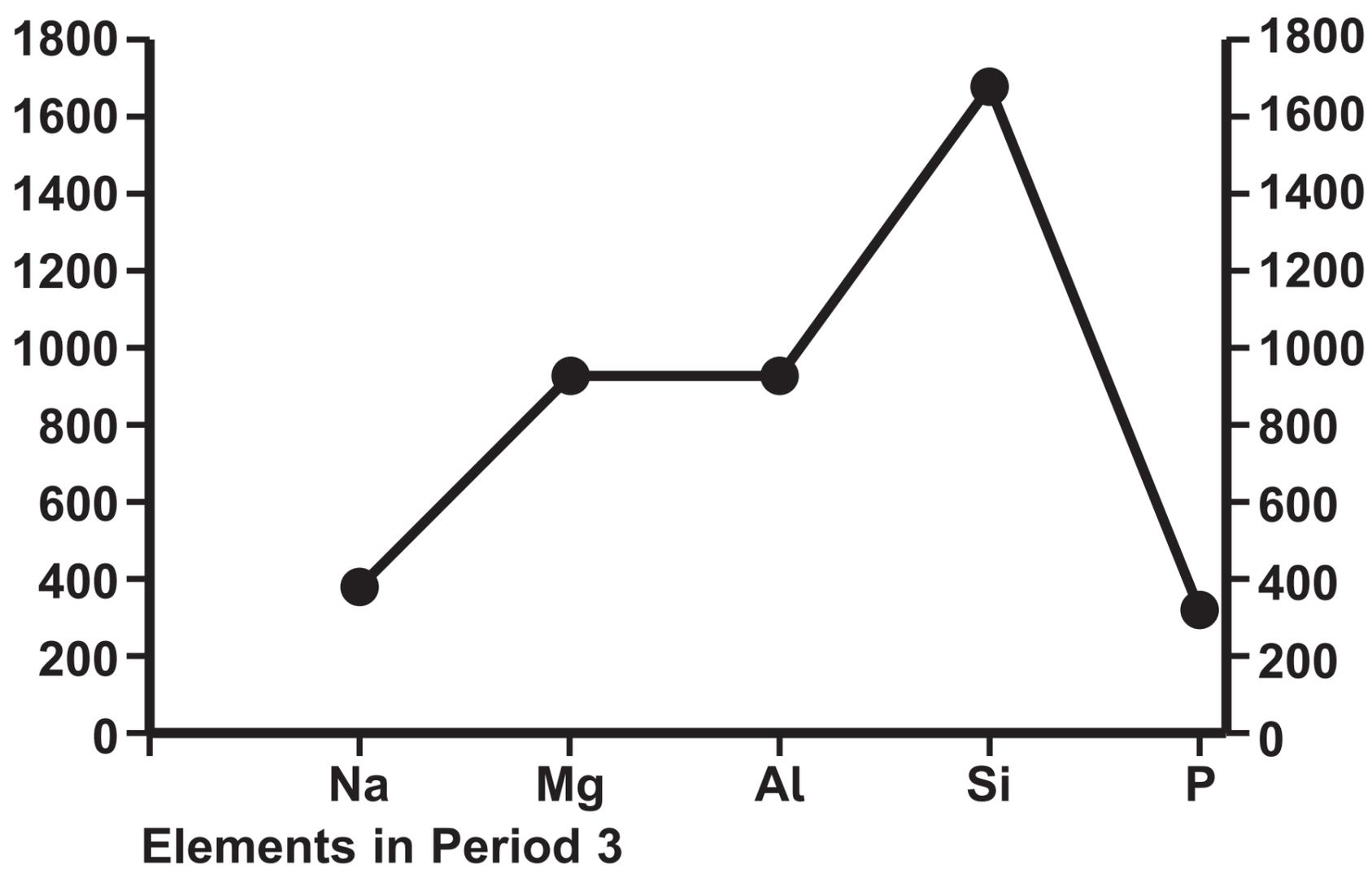
s orbital	p orbital

Question 3(c)

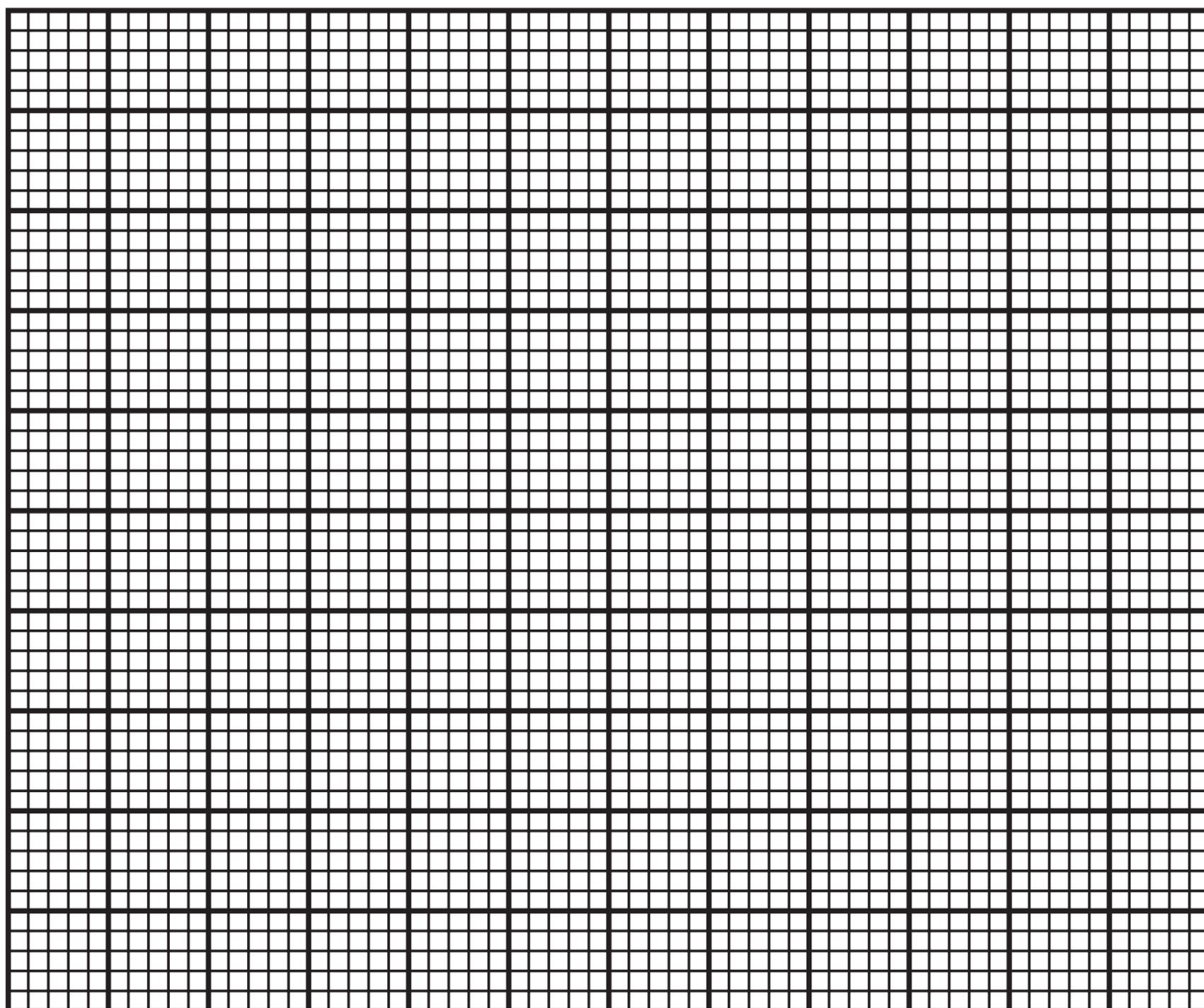


Question 4

Melting temperature / K



Question 5(a)(i)

 $\Delta G / \text{kJ mol}^{-1}$ 

Temperature / K

Question 5(b)

	Position of equilibrium	Change in colour
<input type="checkbox"/> A	moves to the right	mixture gets lighter
<input type="checkbox"/> B	moves to the right	mixture gets darker
<input type="checkbox"/> C	moves to the left	mixture gets lighter
<input type="checkbox"/> D	moves to the left	mixture gets darker

Question 6(a)

[K_a of benzoic acid = $6.3 \times 10^{-5} \text{ mol dm}^{-3}$; K_a of nitric acid = 40 mol dm^{-3}]



- | | | | | |
|----------------------------|------|------|------|------|
| <input type="checkbox"/> A | acid | base | acid | base |
| <input type="checkbox"/> B | acid | base | base | acid |
| <input type="checkbox"/> C | base | acid | base | acid |
| <input type="checkbox"/> D | base | acid | acid | base |

Question 7(b)(ii)

Element	Atomic number	1st ionisation energy / kJ mol⁻¹	2nd ionisation energy / kJ mol⁻¹	Metallic radius / nm
Chromium	24	653	1592	0.129
Calcium	20	590	1145	0.197

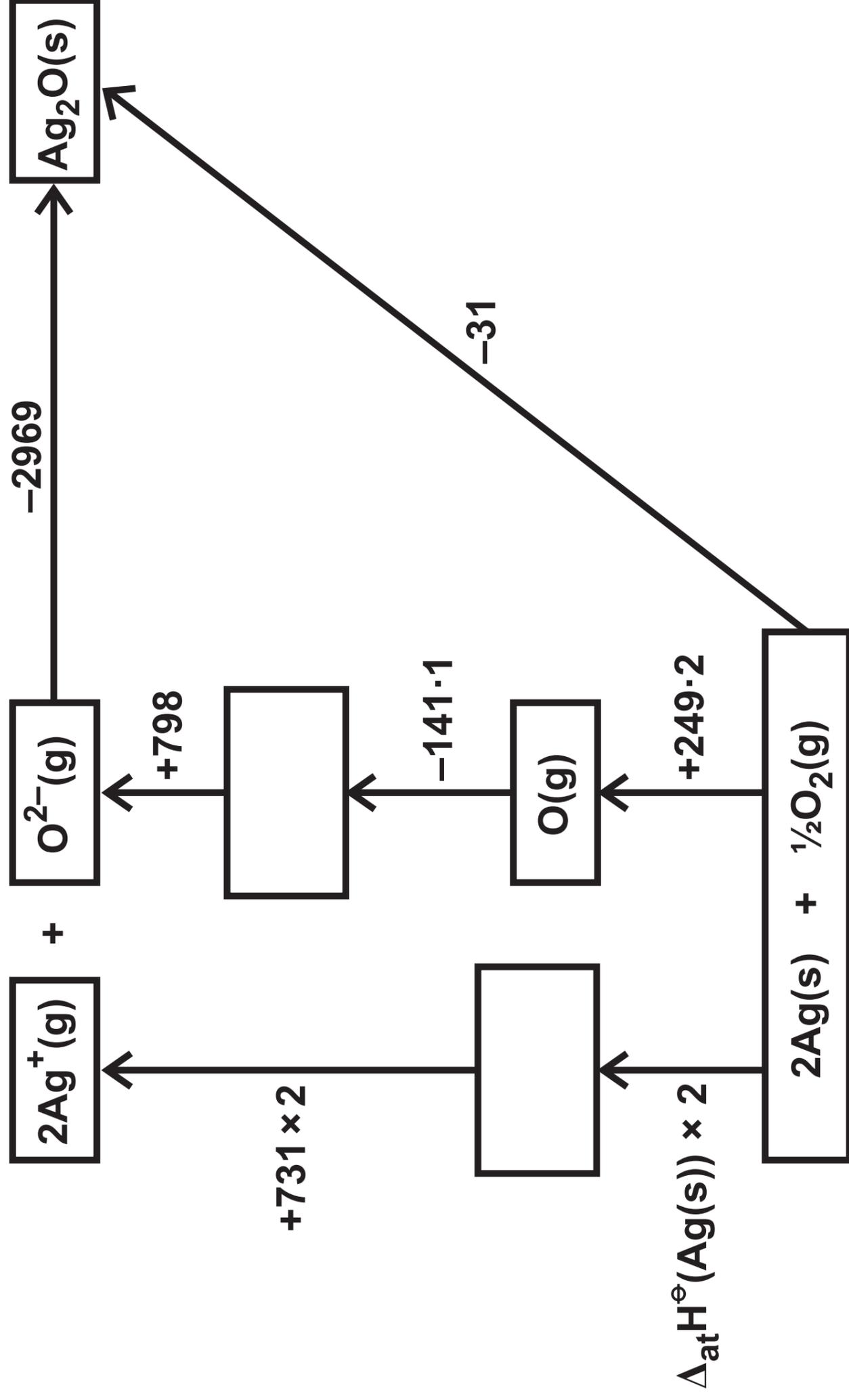
Question 7(d)**Equilibrium 1**

$$E^\ominus = +1.33 \text{ V}$$

Equilibrium 2

$$E^\ominus = +1.36 \text{ V}$$

Question 9(a)



Question 9(b)

Compound	Experimental lattice energy / kJ mol⁻¹	Theoretical lattice energy / kJ mol⁻¹
Silver chloride	-905	-833

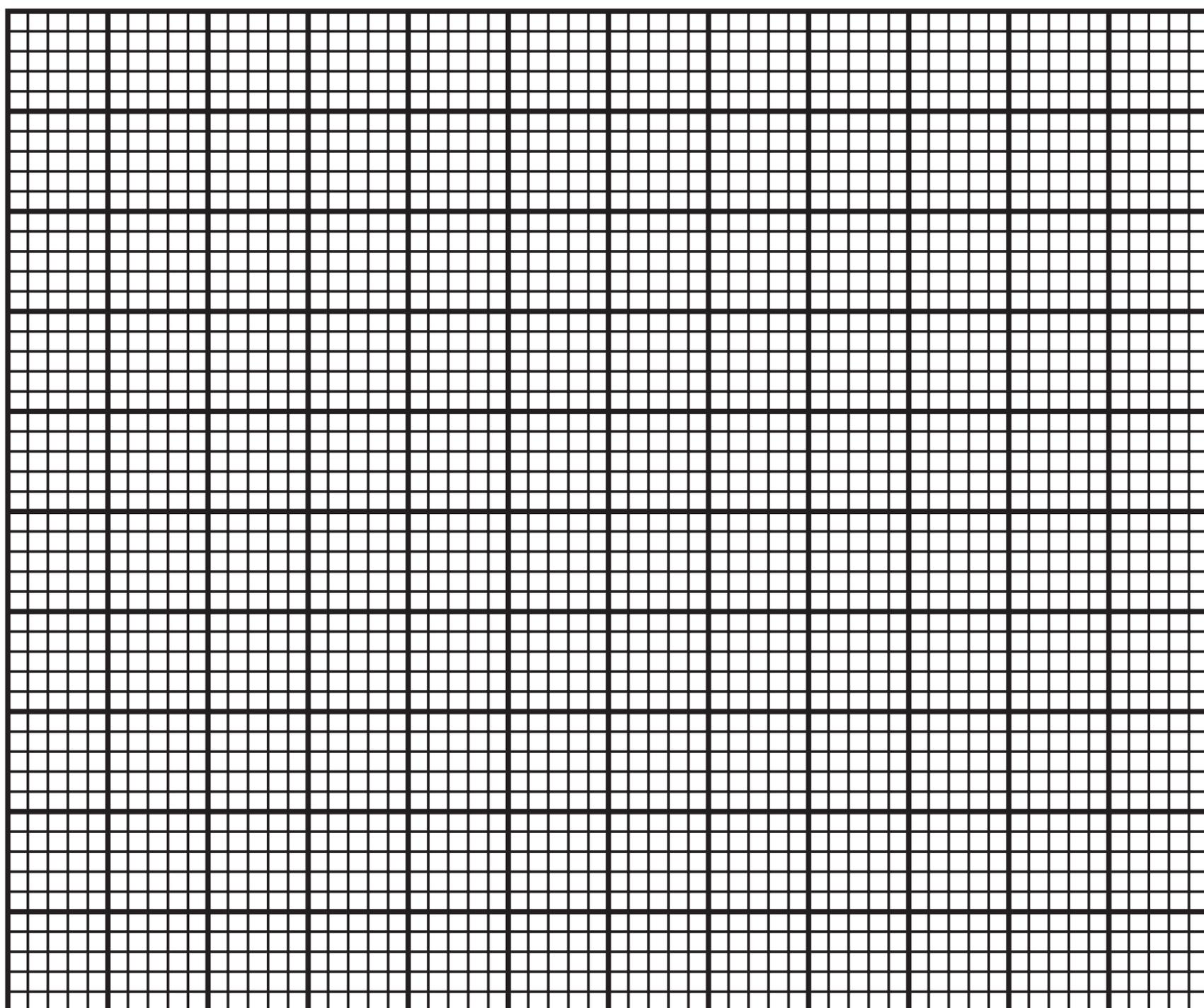
Question 10(d)

Half-cell	Electrode system	E^\ominus / V
A	$\text{MnO}_2(\text{s}) + 4\text{H}^+(\text{aq}) + \text{e}^- \rightleftharpoons \text{Mn}^{3+}(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$	+0.95
B	$\text{Mn}^{3+}(\text{aq}) + \text{e}^- \rightleftharpoons \text{Mn}^{2+}(\text{aq})$	+1.51

Question 2(b)

s orbital	p orbital

Question 5(a)(i)

 $\Delta G / \text{kJ mol}^{-1}$ 

Temperature / K

Question 9(a)

