

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.**

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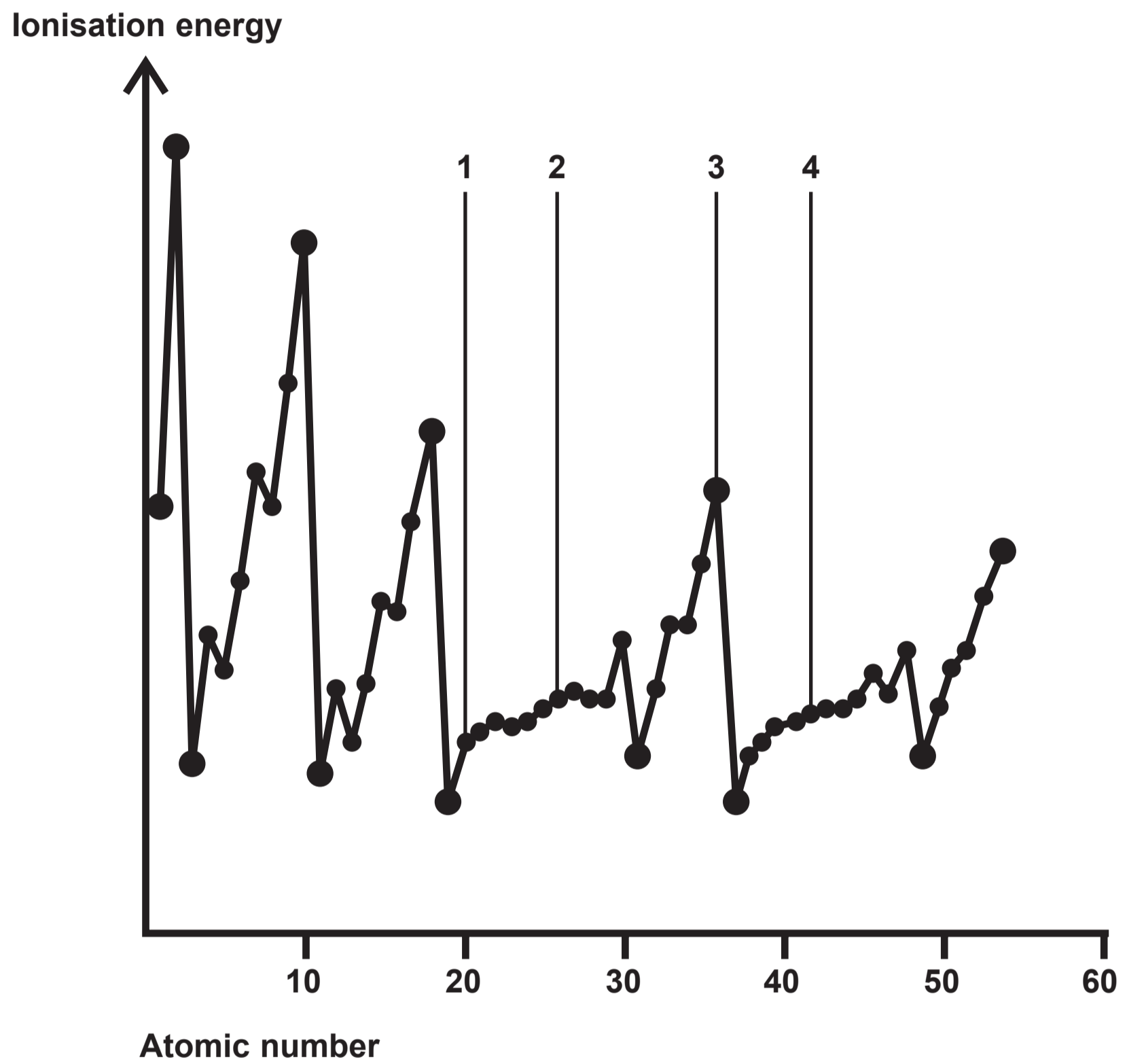
**Spare Copies**

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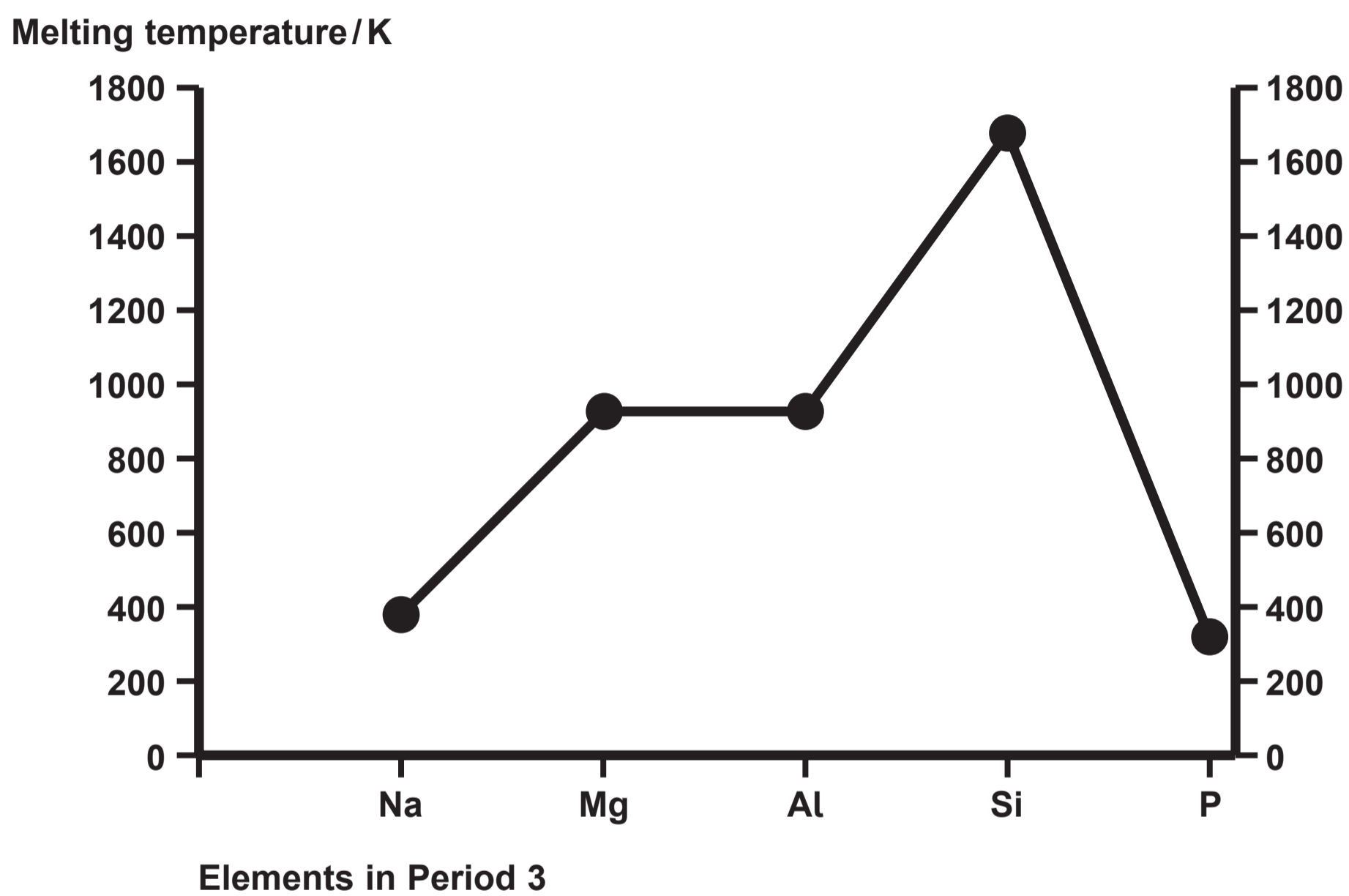
## Question 1(a)



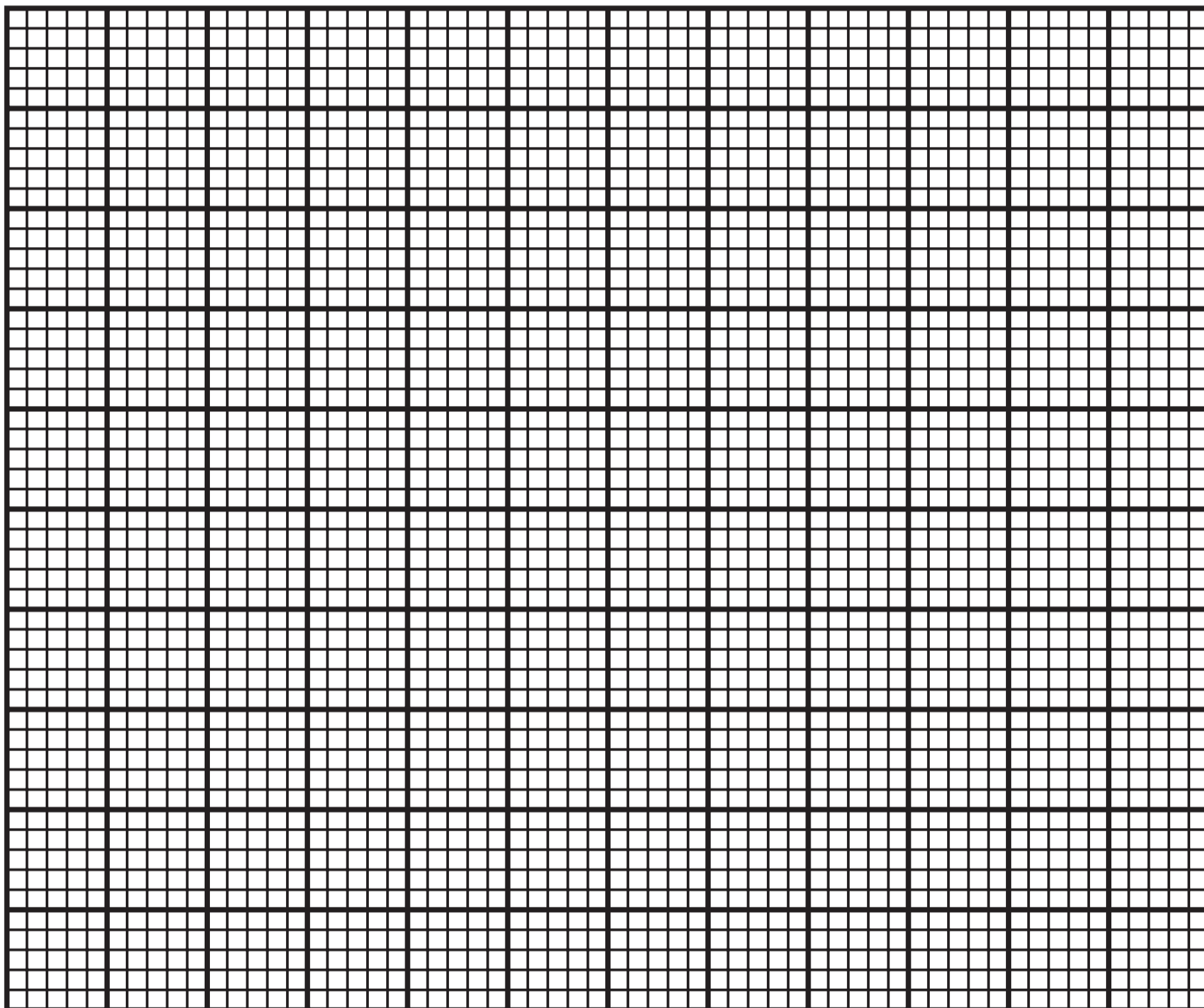
s orbital	p orbital

**Question 3(c)**

## Question 4

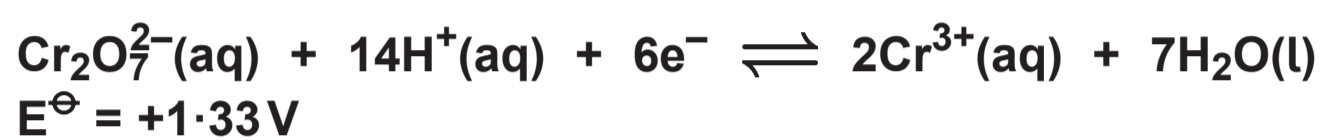
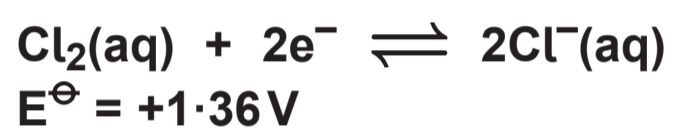


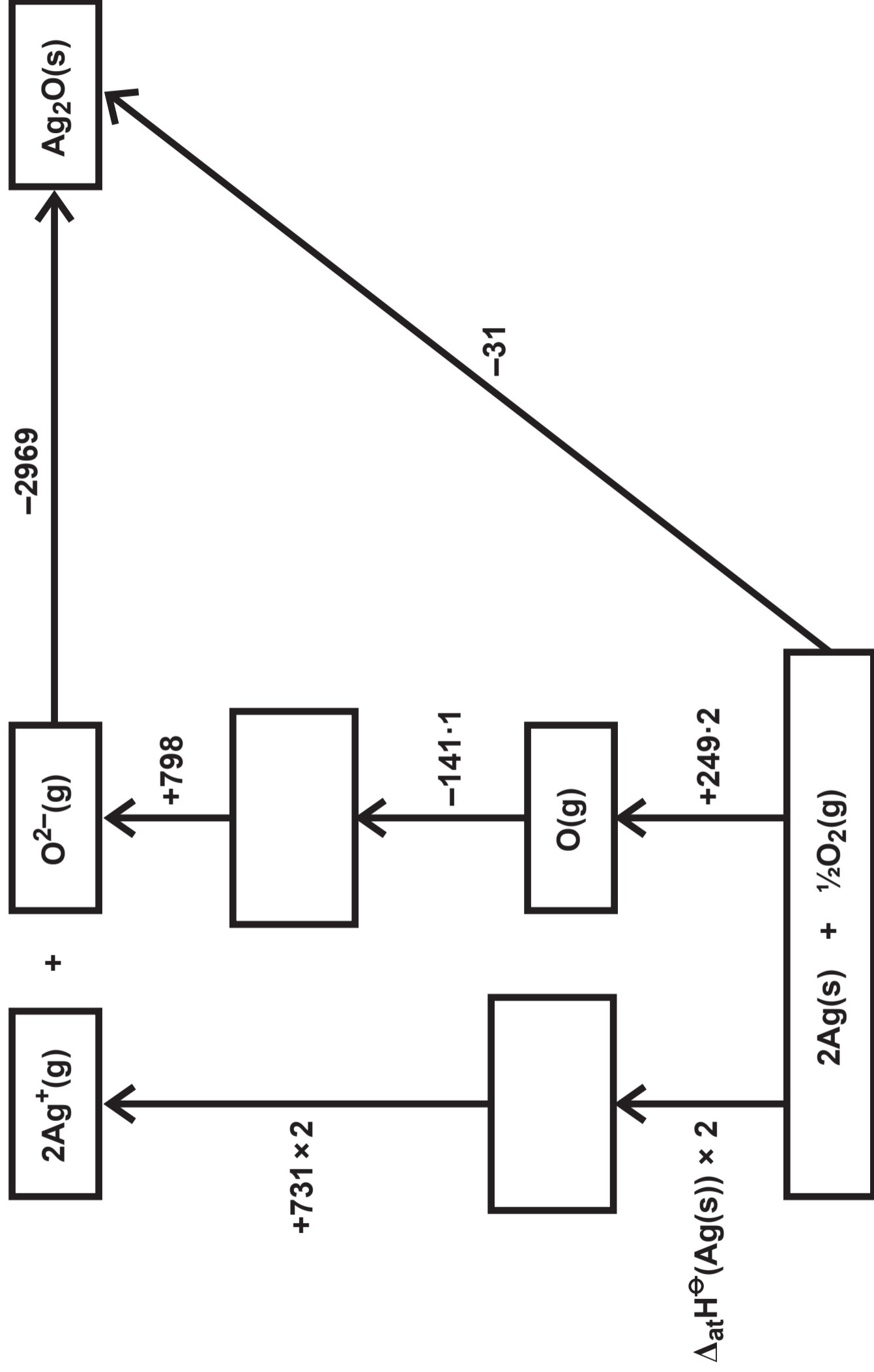
## Question 5(a)(i)

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

Temperature / K

Element	Atomic number	1st ionisation energy /kJ mol <sup>-1</sup>	2nd ionisation energy /kJ mol <sup>-1</sup>	Metallic radius /nm
Chromium	24	653	1592	0·129
Calcium	20	590	1145	0·197

**Question 7(d)****Equilibrium 1****Equilibrium 2**



## Question 9(b)

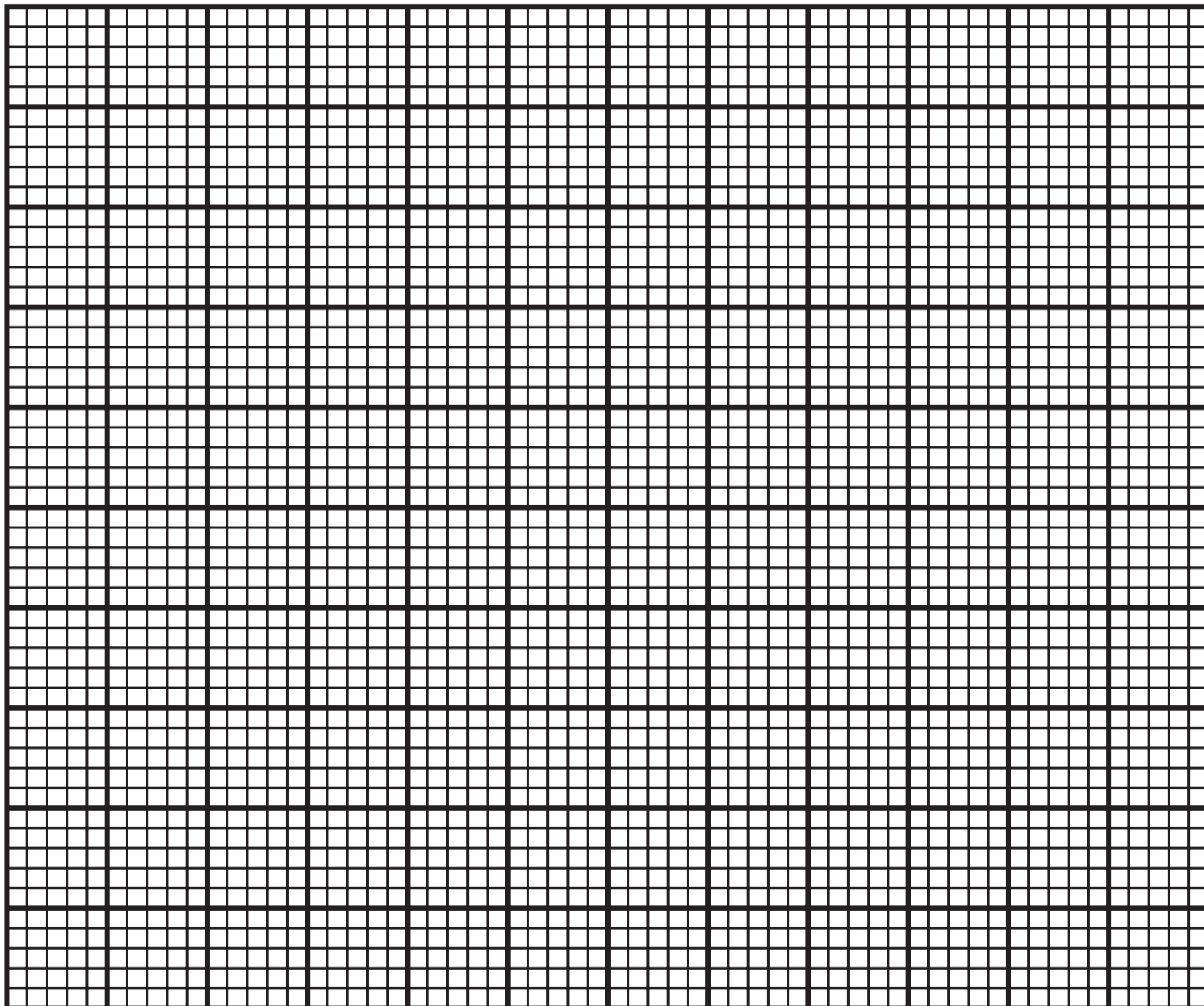
Compound	Experimental lattice energy / $\text{kJ mol}^{-1}$	Theoretical lattice energy / $\text{kJ mol}^{-1}$
Silver chloride	−905	−833

## Question 10(d)

Half-cell	Electrode system	$E^{\ominus} / \text{V}$
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

s orbital	p orbital

## Question 5(a)(i)

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

Temperature / K

