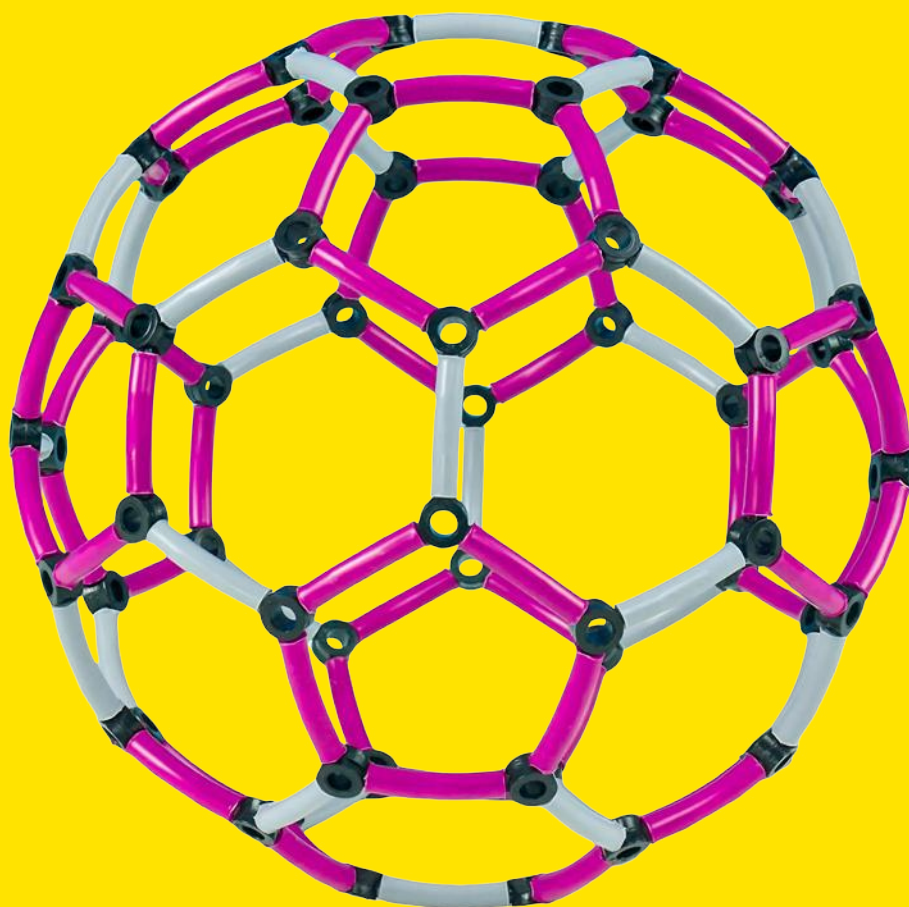


edexcel 

AS

Chemistry



Unit 1
Advanced Practice
2019 - 2026

Edexcel International Advanced Level

CHEMISTRY

Unit 1 · Structure, Bonding and Introduction to Organic Chemistry

WCH11/01

Questions & Answers by Topic

Every past-paper question June 2019 - January 2026, solved in full,
organised under the 21 chapters of the course notes.

21 chapters · 20 papers · every question classified

chem-bio.info

IGCSE & IAL subject resources

Chapter 7

Ionic Bonding

Revise from your notes: pp. 17-18

21 questions · 18 multiple choice · 3 structured

Edexcel IAL - Practice Questions

June 2019 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question 1 · 1

● hard ● medium ● easy

● 1

Select · [1 mark]

Which statement is NOT true for sodium chloride?

- ☐ A sodium chloride conducts electricity in aqueous solution
- ☐ B sodium chloride conducts electricity when molten
- ☐ C sodium chloride has a molecular structure
- ☐ D sodium chloride has a giant structure

Revise from your notes

- Ionic bonds - notes p. 17 7.1
- Covalent bond - notes p. 20 9.1
- Polar molecules - notes p. 26 12.4

Edexcel IAL - Practice Questions

June 2019 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question 5 · 1

● hard ● medium ● easy

● 5

Select · [1 mark]

Which pair of ions gives the strongest ionic bonding?

- ☐ A Na^+ and F^-
- ☐ B K^+ and Br^-
- ☐ C Mg^{2+} and O^{2-}
- ☐ D Ca^{2+} and S^{2-}

Revise from your notes

- Ionic bonds - notes p. 17 7.1
- Covalent bond - notes p. 20 9.1
- Polar molecules - notes p. 26 12.4

Edexcel IAL - Practice Questions

October 2019 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 8

Select · [1 mark]

Some ionic radii are shown. Which compound has the strongest ionic bonding?

Ion	Ionic radius / nm
Na^+	0.102
K^+	0.138
F^-	0.133
Cl^-	0.180

The ionic radii

- ☐ **A** sodium fluoride
- ☐ **B** sodium chloride
- ☐ **C** potassium fluoride
- ☐ **D** potassium chloride

Revise from your notes

- Counting particles - notes p. 2 1.6
- Strength of ionic bonding - notes p. 17 7.2
- Isoelectronic particles - notes p. 10 4.5
- Dative covalent bond - notes p. 20 9.2

Edexcel IAL - Practice Questions

January 2020 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 8

Select · [1 mark]

Which of these ionic compounds would be expected to have the highest melting temperature?

- ☐ A NaF
- ☐ B MgO
- ☐ C KCl
- ☐ D CaS

Revise from your notes

- Essential definitions & the mole - notes p. 1 1.1
- Writing ionic equations - notes p. 1 1.2
- Atom economy - notes p. 2 1.5
- Solutions and concentrations - notes p. 3 1.8
- Strength of ionic bonding & polarisation - notes p. 17-18 7.2 7.5

Edexcel IAL - Practice Questions

October 2020 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 2 (a)

Select · [1 mark]

When zinc is added to copper(II) sulfate solution, copper is formed. Which is the best name for this type of reaction?

- ☐ A addition
 - ☐ B displacement
 - ☐ C neutralisation
 - ☐ D substitution
-

● 2 (b)

Select · [1 mark]

Which is the ionic half-equation for a process that takes place during this reaction?

- ☐ A $\text{Cu}^{2+} + \text{e}^- \rightarrow \text{Cu}^+$
 - ☐ B $\text{Cu}^+ + \text{e}^- \rightarrow \text{Cu}$
 - ☐ C $\text{Zn} \rightarrow \text{Zn}^+ + \text{e}^-$
 - ☐ D $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$
-

Revise from your notes

- The empirical formula - notes p. 2 1.4
 - Counting particles - notes p. 2 1.6
 - Percentage composition - notes p. 1 1.3
 - Writing ionic equations - notes p. 1 1.2
-

Edexcel IAL - Practice Questions

October 2020 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 5

Select · [1 mark]

The formula of barium chloride is BaCl_2 . Which is correct for barium chloride? [A_r : Ba = 137.3, Cl = 35.5]

- ☐ A barium chloride exists as a molecule
- ☐ B barium chloride is a compound
- ☐ C the empirical formula of barium chloride is BaCl
- ☐ D the M_r of barium chloride is 172.8

Revise from your notes

- The empirical formula - notes p. 2 1.4
- Counting particles - notes p. 2 1.6
- Percentage composition - notes p. 1 1.3
- Writing ionic equations - notes p. 1 1.2

Edexcel IAL - Practice Questions

January 2022 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 1 (a)

Select · [1 mark]

Element X is in Group 2 and element Y is in Group 7. What is the formula of the compound formed from X and Y?

- ☐ A XY
- ☐ B X_2Y
- ☐ C XY_2
- ☐ D X_2Y_2

● 1 (b)

Select · [1 mark]

Under what conditions does the compound formed from X and Y conduct electricity?

- ☐ A in the solid state and in the liquid state and in aqueous solution
- ☐ B in the solid state and in aqueous solution only
- ☐ C in the solid state and in the liquid state only
- ☐ D in the liquid state and in aqueous solution only

Revise from your notes

- Ionic bonds - notes p. 17 7.1
- Strength of ionic bonding - notes p. 17 7.2
- Isoelectronic particles - notes p. 10 4.5
- Polarisation of anions - notes p. 18 7.5

Edexcel IAL - Practice Questions

January 2022 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 2

Select · [1 mark]

Which of these compounds would you expect to have the highest melting temperature?

☐ A NaCl

☐ B NaF

☐ C KCl

☐ D KF

Revise from your notes

- Ionic bonds - notes p. 17 7.1
- Strength of ionic bonding - notes p. 17 7.2
- Isoelectronic particles - notes p. 10 4.5
- Polarisation of anions - notes p. 18 7.5

Edexcel IAL - Practice Questions

January 2022 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 3

Predict · [1 mark]

A drop of green copper(II) chromate(VI) solution is placed at the centre of a strip of damp filter paper connected to a DC supply. What is observed after a few minutes?

- ☐ A a green colour has moved to the negative end
 - ☐ B a green colour has moved to the positive end
 - ☐ C a yellow colour has moved to the positive end and a blue colour to the negative end
 - ☐ D a blue colour has moved to the positive end and a yellow colour to the negative end
-

Revise from your notes

- Ionic bonds - notes p. 17 7.1
 - Strength of ionic bonding - notes p. 17 7.2
 - Isoelectronic particles - notes p. 10 4.5
 - Polarisation of anions - notes p. 18 7.5
-

Edexcel IAL - Practice Questions

June 2022 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question 10

● hard ● medium ● easy

● 10

Select · [1 mark]

Which row shows the correct forces in a crystal of lithium iodide?

	Attractive forces between ions with opposite charges	Repulsive forces between ions with like charges	Some covalent bonding forces
A	✓	×	×
B	✓	✓	×
C	✓	×	✓
D	✓	✓	✓

The four rows of ticks and crosses for the three types of force

- ☐ **A** attractive forces only
- ☐ **B** attractive + repulsive forces (no covalency)
- ☐ **C** attractive forces + some covalency (no repulsion)
- ☐ **D** attractive + repulsive forces + some covalent bonding

Revise from your notes

- Structure of the atom - notes p. 5 2.1
- Mass spectrometer calculations - notes p. 7 3.3
- Rules for electron configuration - notes p. 9 4.3
- First ionisation energy - notes p. 11 5.1

Edexcel IAL - Practice Questions

June 2022 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question 11

● hard ● medium ● easy

● 11 (a)

Select · [1 mark]

The table gives properties of five substances (the letters are not element symbols). Which of these substances could be metals?

Substance	Electrical conductivity			Melting temperature /°C
	Solid	Liquid	Solution in water	
L	poor	good	good	770
M	good	good	reacts	98
N	good	good	insoluble	1083
P	poor	poor	insoluble	113
Q	poor	poor	good	10

Conductivity as solid, liquid and in solution, plus melting temperature, for substances L to Q

- ☐ A N only
- ☐ B L and M only
- ☐ C M and N only
- ☐ D L, M and N only

● 11 (b)

Select · [1 mark]

Using the same table, which substance changes from a molecular structure to ions when it dissolves in water?

- ☐ A L
- ☐ B M
- ☐ C P
- ☐ D Q

Revise from your notes

- The metallic lattice - notes p. 19 8.1
 - Dative covalent bond - notes p. 20 9.2
 - Safety in chemistry experiments - notes p. 27 13.1
 - Bond fission - notes p. 33 17.1
-

Edexcel IAL - Practice Questions

January 2023 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 11

Select · [1 mark]

Which combination of ions would form the compound with the highest melting temperature?

- ☐ A Li^+ and Br^-
- ☐ B Mg^{2+} and O^{2-}
- ☐ C Sr^{2+} and S^{2-}
- ☐ D Rb^+ and Cl^-

Revise from your notes

- Strength of ionic bonding - notes p. 17 7.2
- Graphene - notes p. 22 10.6
- Bond angle - notes p. 23 11.3
- Polar molecules - notes p. 26 12.4
- Safety in chemistry experiments - notes p. 27 13.1

Edexcel IAL - Practice Questions

June 2023 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question 1 · 1

● hard ● medium ● easy

● 1

Select · [1 mark]

Which compound has the greatest covalent character?

- ☐ A MgBr_2
- ☐ B MgF_2
- ☐ C NaBr
- ☐ D NaF

Revise from your notes

- Polarisation of anions - notes p. 18 7.5
- Bond classification by electronegativity - notes p. 25 12.3
- Isoelectronic particles - notes p. 10 4.5
- Successive ionisation energies - notes p. 11 5.3
- Writing electron configurations - notes p. 8 4.2

Edexcel IAL - Practice Questions

June 2023 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question 11

● hard ● medium ● easy

● 11

Select · [1 mark]

Green copper(II) chromate(VI) crystals are placed on damp filter paper connected to a 20 V DC supply. What colours appear at the positive and negative electrodes after a few minutes?

- ☐ A positive blue · negative yellow
- ☐ B positive green · negative blue
- ☐ C positive yellow · negative green
- ☐ D positive yellow · negative blue

Revise from your notes

- Solutions and concentrations - notes p. 3 1.8
- Electrolysis is evidence of ions - notes p. 18 7.4
- Melting points in metallic elements - notes p. 15 6.8
- Bond angle and electron pair repulsion - notes p. 23 11.3
- Polar molecules - notes p. 26 12.4

Edexcel IAL - Practice Questions

June 2023 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question 20 ·

● hard ● medium ● easy

● 20 (a)(i)

Write · [1 mark]

Barium chloride is prepared from barium carbonate and hydrochloric acid: $\text{BaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{BaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$. Write the ionic equation. State symbols are not required.

● 20 (a)(ii)

Calculate · [2 marks]

Calculate the atom economy by mass for this preparation of barium chloride. [A_r : H 1.0, C 12.0, O 16.0, Cl 35.5, Ba 137.3]

● 20 (a)(iii)

Explain · [4 marks]

Barium chloride melts at 962 C, caesium chloride at 646 C. Explain, by considering the ions involved, the difference between the melting temperatures of these Period 6 chlorides.

● **20 (a)(iv)**

Explain · [2 marks]

Covalent and ionic bonding are extremes of a continuum. Explain the difference in bonding between barium chloride and beryllium chloride using the electronegativities: Ba 0.9, Be 1.5, Cl 3.0.

● **20 (b)**

Identify · [4 marks]

A Group 1 sulfate M_2SO_4 reacts: $M_2SO_4(aq) + BaCl_2(aq) \rightarrow BaSO_4(s) + 2MCl(aq)$.
7.98 g of the sulfate gives 10.72 g of $BaSO_4$ precipitate. Identify the Group 1 element.
[A_r : Ba 137.3, S 32.1, O 16.0]

Revise from your notes

- Writing ionic equations - notes p. 1 1.2
- Atom economy - notes p. 2 1.5
- Strength of ionic bonding - notes p. 17 7.2
- Classification of bonds using electronegativity - notes p. 25 12.3

Edexcel IAL - Practice Questions

October 2023 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 7

Select · [1 mark]

A direct current is passed through a green solution of copper(II) chromate(VI). Which colours are seen at each electrode after several minutes?

- ☐ A negative electrode blue, positive electrode green
- ☐ B negative electrode green, positive electrode blue
- ☐ C negative electrode blue, positive electrode yellow
- ☐ D negative electrode yellow, positive electrode blue

Revise from your notes

- Dative covalent bond - notes p. 20 9.2
- First ionisation energy trend - notes p. 13 6.5
- Exceptions to the trend - notes p. 14 6.6
- Electrolysis is evidence of ions - notes p. 18 7.4
- Mass spectrometer of diatomic molecules - notes p. 7 3.4

Edexcel IAL - Practice Questions

January 2024 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 20 (a)(i)

Calculate · [4 marks]

A sample of magnesium ($A_r = 24.32$) has three isotopes. Two are mass 24 (78.99%) and mass 25 (10.00%). Calculate the relative abundance and hence the mass number of the third isotope, to the appropriate number of significant figures.

● 20 (a)(ii)

State · [1 mark]

State one similarity and one difference between these isotopes.

● 20 (a)(iii)

State · [1 mark]

State which of these isotopes would be deflected most in a mass spectrometer. Justify your answer.

● 20 (b)(i)

Draw · [2 marks]

Draw a dot-and-cross diagram to show the bonding in magnesium oxide, MgO . Show outer electrons only.

● 20 (b)(ii)

Explain · [2 marks]

The melting temperatures of MgO and MgSO_4 are 2852 degrees C and 1124 degrees C. Explain why MgO melts at a significantly higher temperature.

● 20 (c)

Explain · [2 marks]

Magnesium conducts as a solid and a liquid; MgO conducts only as a liquid (not as a solid). Explain the similarities and differences in their electrical conductivity.

● 20 (d)(i)

Write · [2 marks]

Magnesium sulfate can be made from magnesium and dilute sulfuric acid. Write an equation for the reaction, including state symbols.

● **20 (d)(ii)**

State · [2 marks]

Give two observations you would make when the reaction is taking place.

● **20 (e)(i)**

Calculate · [1 mark]

Magnesium was added to 30.0 cm^3 of $0.500 \text{ mol dm}^{-3}$ sulfuric acid. Calculate the moles of sulfuric acid used.

● **20 (e)(ii)**

Calculate · [1 mark]

Calculate the mass of magnesium needed to react with the sulfuric acid. [A_r : Mg = 24.3]

● **20 (e)(iii)**

Give · [1 mark]

Give a reason why slightly more than this mass of magnesium was used.

● **20 (e)(iv)**

State · [1 mark]

State how the magnesium sulfate solution could be separated from the mixture produced.

• **20 (e)(v)**

Calculate · [2 marks]

The mass of hydrated crystals, $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, obtained was 2.78 g. Calculate the percentage yield. [M_r : $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ = 246.4]

Revise from your notes

- Isotopes - notes p. 5 2.2
- Ionic bonds - notes p. 17 7.1
- Strength of ionic bonding - notes p. 17 7.2
- The metallic lattice - notes p. 19 8.1
- Percentage yield - notes p. 2 1.7

Edexcel IAL - Practice Questions

June 2024 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question 12

● hard ● medium ● easy

● 12

Select · [1 mark]

Which pair of compounds will NOT react to form a precipitate?

- ☐ A $\text{AgNO}_3(\text{aq})$ and $\text{CaCl}_2(\text{aq})$
- ☐ B $\text{Ca}(\text{OH})_2(\text{aq})$ and $\text{CO}_2(\text{g})$
- ☐ C $\text{Ba}(\text{OH})_2(\text{aq})$ and $\text{HCl}(\text{aq})$
- ☐ D $\text{KI}(\text{aq})$ and $\text{Pb}(\text{NO}_3)_2(\text{aq})$

Revise from your notes

- Writing ionic equations - notes p. 1 1.2
- Essential definitions - notes p. 1 1.1
- Types of organic reactions - notes p. 28 13.4

Edexcel IAL - Practice Questions

October 2024 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 11

Select · [1 mark]

Which row shows properties consistent with the bonding type shown? Columns: bonding | solubility | melting temp | conductivity of solid.

- ☐ A ionic | soluble | high | poor
- ☐ B ionic | soluble | low | good
- ☐ C metallic | soluble | low | good
- ☐ D metallic | insoluble | high | poor

Revise from your notes

- Atomic and ionic radius - notes p. 13 6.3 6.4
- Melting points of non-metals - notes p. 15 6.9
- Isoelectronic particles - notes p. 10 4.5
- Free radical substitution - notes p. 33 17.3

Edexcel IAL - Practice Questions

January 2025 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 12

Deduce · [1 mark]

Which cation would be the most polarising - one with a small or large radius, and a small or large charge?

- ☐ A small radius, large charge
- ☐ B small radius, small charge
- ☐ C large radius, small charge
- ☐ D large radius, large charge

Revise from your notes

- Ionic radius - notes p. 13 6.4
- Polarisation of anions - notes p. 18 7.5
- Polar molecules - notes p. 26 12.4
- Safety in chemistry experiments - notes p. 27 13.1
- Naming organic compounds - notes p. 28 13.3

Edexcel IAL - Practice Questions

January 2026 · Unit 1: Structure, Bonding and Introduction to Organic Chemistry (WCH11/01) · Question

● hard ● medium ● easy

● 21 (a)

Describe · [2 marks]

Describe the metallic bonding in sodium.

● 21 (b)

Explain · [2 marks]

Explain how the melting temperature of magnesium compares to that of sodium.

● 21 (c)

Draw · [2 marks]

Draw a dot-and-cross diagram showing the ionic bonding in sodium fluoride. Use dots for fluorine electrons and crosses for sodium electrons, and include all electron shells.

● 21 (d)

Explain · [2 marks]

Explain how the sodium ion and the fluoride ion compare in size.

● **21 (e)**

Explain · [4 marks]

Explain the electrical conductivities of sodium and sodium fluoride in the solid and liquid states.

● **21 (f)**

Calculate · [3 marks]

A 1.00 g sample of toothpaste contains 5.68×10^{-5} mol of sodium fluoride. Calculate the concentration of fluoride ions in ppm, to an appropriate number of significant figures. [A_r : F = 19.0]

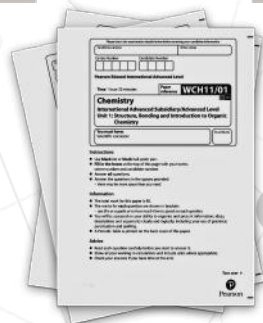
Revise from your notes

- The metallic lattice - notes p. 19 8.1
 - Melting points in metals - notes p. 15 6.8
 - Ionic bonds - notes p. 17 7.1
 - Ionic radius - notes p. 13 6.4
 - Electrolysis is evidence of ions - notes p. 18 7.4
-

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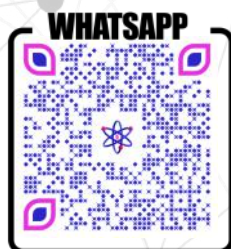
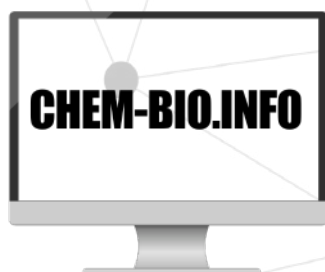
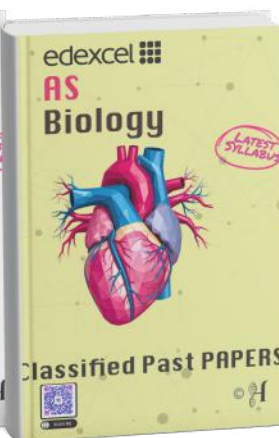
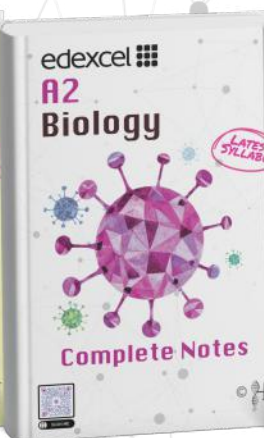
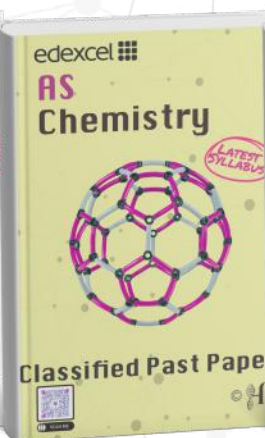
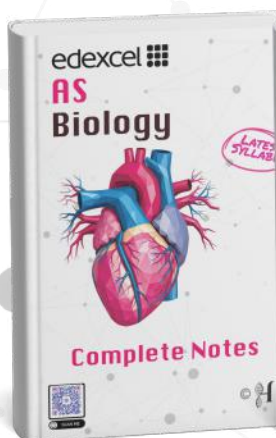
Videos that cover the entire syllabus



Exam-expert solved past papers



Full explanation of Unit 3 practicals



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