



International Baccalaureate®
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Chemistry

Higher and Standard level

Specimen papers 1A, 1B and 2

For first examinations in 2025

CONTENTS

Chemistry higher level paper 1A specimen question paper

Chemistry higher level paper 1A specimen markscheme

Chemistry higher level paper 1B specimen question paper

Chemistry higher level paper 1B specimen markscheme

Chemistry higher level paper 2 specimen question paper

Chemistry higher level paper 2 specimen markscheme

Chemistry standard level paper 1A specimen question paper

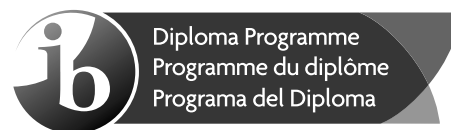
Chemistry standard level paper 1A specimen markscheme

Chemistry standard level paper 1B specimen question paper

Chemistry standard level paper 1B specimen markscheme

Chemistry standard level paper 2 specimen question paper

Chemistry standard level paper 2 specimen markscheme



Chemistry
Higher level
Paper 1A

Specimen paper

2 hours [Paper 1A and Paper 1B]

Instructions to candidates

- Do not open this examination paper until instructed to do so.
- Answer all questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- A calculator is required for this paper.
- A clean copy of the **chemistry data booklet** is required for this paper.
- The maximum mark for paper 1A is **[40 marks]**.
- The maximum mark for paper 1A and paper 1B is **[75 marks]**.

Section A

- What is thin-layer chromatography best used for separating?
 - molecules of varying polarity
 - molecules of similar polarity
 - metals in an alloy
 - water of crystallization from hydrated salts
- Ice containing only the isotope ^2H sinks and does not melt when dropped into ordinary distilled water maintained at 3°C .

Which statement is correct?

- The isotope ^2H has a high natural abundance.
 - $^2\text{H}_2\text{O}(\text{s})$ has a higher melting point than normal ice.
 - $^2\text{H}_2\text{O}(\text{s})$ has a lower density than normal ice-cold water.
 - $^2\text{H}_2\text{O}$ has different chemical properties from normal water.
- The table lists successive ionization energies of an element **Z**.

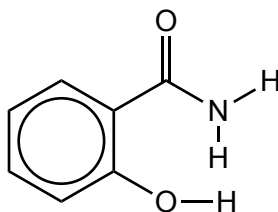
Ionization number	1st	2nd	3rd	4th	5th	6th
Ionization energy / kJ mol^{-1}	577.54	1816.68	2744.78	11 577.5	14 841.9	18 379.0

Which is the formula of the stable oxide of the element **Z**?

- Z_2O
- ZO
- Z_2O_3
- ZO_2

4. A container holds 30 g of argon and 60 g of neon.
What is the ratio of number of atoms of argon to number of atoms of neon in the container?
- A. 0.25
B. 0.50
C. 2.0
D. 4.0
5. A gas storage tank of fixed volume V contains N molecules of an ideal gas at 300 K with a pressure of 40 kPa. $\frac{N}{4}$ molecules are removed, and the temperature is changed to 450 K.
What is the new pressure of the gas in kPa?
- A. 15
B. 30
C. 45
D. 60
6. What is the formula of the compound formed between magnesium ions and hydrogencarbonate ions?
- A. MgHCO_3
B. $\text{Mg}(\text{HCO}_3)_2$
C. $\text{Mg}(\text{HCO}_3)_3$
D. $\text{Mg}_3(\text{HCO}_3)_2$
7. In which group of ions and molecules are electrons delocalized in all species?
- A. CH_3COOH , O_3 , C_{60}
B. CH_3COO^- , NO_2^- , $\text{C}(\text{graphite})$
C. C_2H_2 , $(\text{COOH})_2$, $\text{C}(\text{diamond})$
D. C_2H_4 , NO_2^+ , SiO_2

8. What is the molecular geometry of the central atom in SF_4Cl_2 ?
- A. linear
- B. tetrahedral
- C. hexagonal
- D. octahedral
9. Which is the preferred Lewis formula of nitrous oxide, N_2O , as deduced by formal charges?
- A. $\ddot{\text{N}}=\text{N}=\ddot{\text{O}}$
- B. $:\text{N}\equiv\text{N}-\ddot{\text{O}}:$
- C. $:\ddot{\text{N}}-\text{N}\equiv\text{O}:$
- D. $\ddot{\text{N}}=\text{O}=\ddot{\text{N}}$
10. Which pair of statements about electrons in this molecule is correct?



	Number of non-bonding pairs of electrons	Number of electrons in π bonds
A.	3	6
B.	3	8
C.	5	6
D.	5	8

11. What is the explanation for the malleability of metals?
- A. The bonds are strong.
- B. The bonds are weak.
- C. The bonds involve free electrons.
- D. The bonds do not have a specific direction.