

# **CHEMISTRY ENTRANCE TEST SAMPLE PAPER**

sample paper only provide  
10 MCQ and 2 SAQ

Actual Paper  
Total 30 MCQ + 4 SAQ

Each MCQ is 2 marks  
Each SAQ is 10 marks

## Instructions

1. This is a **closed-book** test.
2. It has a time limit of **90 minutes** and allows for only **ONE attempt (submission)**.
3. Alert the invigilator if you are facing technical difficulties.
4. You are to **ensure** that:
  - your laptops, computers and any other devices used for this test is in good functioning order and have uninterrupted power supply and internet connection throughout the duration of the test.
  - you are in a conducive environment throughout the duration of the test.
  - your answers are correctly saved by the end of the test.
5. You are **allowed** to use:
  - a scientific calculator.
  - A blank piece of paper (no larger than A4 size) for rough work. The paper will not be accepted for submission at the end of the test.
6. You are **not allowed** to:
  - leave the test or leave your devices throughout the duration of the test.
  - use the washroom throughout the duration of the test.
  - communicate with any person, either face-to-face or through any communication device, other than the invigilator.
  - refer to any references, e.g. textbooks, resources from a laptop or smart devices etc.
  - share materials (e.g. electronic calculator) during the test.
  - use any communication devices such as mobile phones, tablets, smart watches, headsets during the test.
7. Enter the password provided by the invigilator to start Test paper.

**SECTION A (20 MARKS)**

Answer **ALL** questions in this section in the spaces provided.

- A1. Methanol boils at 65°C and water boils at 100°C. Given that methanol and water are completely miscible with each other, which is the **MOST SUITABLE** method to separate a mixture of these two liquids?
- Evaporation
  - Crystallisation
  - Fractional distillation
  - Paper chromatography ( )
- A2. A stopper was removed from a bottle containing perfume **A** and the time taken for the scent to reach the opposite side of the room was noted. The experiment was repeated using perfume **B**, which had a **LOWER** molecular mass than perfume **A**. Based on the information provided, predict the time taken for perfume **B** to reach the opposite side of the room compared to perfume **A**.
- Same as perfume **A**.
  - Shorter than perfume **A**.
  - Longer than perfume **A**.
  - Insufficient data to compare the time taken by perfume **A** and **B**. ( )
- A3. Two isotopes of carbon are  $^{12}_6\text{C}$  and  $^{13}_6\text{C}$ . Which statement about the isotopes is **TRUE**?
- They have the same number of electrons and neutrons.
  - They have the same number of electrons and protons.
  - They have the same number of neutrons and protons.
  - They have the same number of nucleons and electrons. ( )
- A4. A label is missing from a bottle of green solution **C**. In order to identify the solution, two chemical tests are carried out.
- Test 1: A few drops of aqueous sodium hydroxide are added to a sample of solution **C**. A green precipitate is formed.
- Test 2: Excess aqueous sodium hydroxide and aluminium are added to another sample of solution **C** and heated. A pungent gas, which turns damp red litmus paper blue, is produced.

What is **C**?

- a. Iron(II) nitrate  
 b. Iron(III) nitrate  
 c. Iron(II) sulfate  
 d. Iron(III) sulfate ( )

A5. Which statement describes the formation of a covalent bond?

- a. Electrons are shared between metallic atoms.  
 b. Electrons are shared between non-metallic atoms.  
 c. Electrons are transferred from a metallic atom to a non-metallic atom.  
 d. Electrons are transferred from a non-metallic atom to a metallic atom. ( )

A6. The electronic configuration of atom **D** is 2, 7. The electronic configuration of atom **E** is 2, 6. What is the formula of the compound formed between atoms **D** and **E**?

- a. **D<sub>2</sub>E**  
 b. **DE<sub>2</sub>**  
 c. **D<sub>6</sub>E**  
 d. **DE<sub>7</sub>** ( )

A7. Manganese(III) sulfate has the formula,  $Mn_2(SO_4)_3$ . What is the charge on the manganese ion?

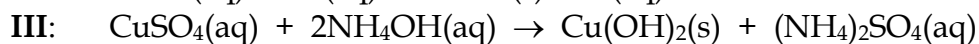
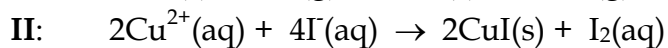
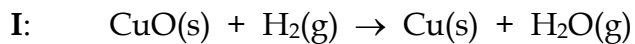
- a. 2+  
 b. 3+  
 c. 2-  
 d. 3- ( )

A8. Dissolving sodium carbonate in water is an exothermic process. Which row shows the change in temperature of solution and the direction of heat flow when sodium carbonate is dissolved in a beaker of water?

	Temperature of solution	Direction of heat flow
a.	Increase	To surrounding
b.	Decrease	To surrounding
c.	Increase	From surrounding
d.	Decrease	From surrounding

( )

A9. In which equation is copper reduced?



a. **I & II**

b. **I & III**

c. **II & III**

d. **I, II & III**

( )

A10. The following reactions are carried out.

Reaction	Result
Ammonium chloride is added to barium hydroxide.	Gas <b>F</b> is given off.
Sulfuric acid is added to ammonium carbonate.	Gas <b>G</b> is given off.
Hydrochloric acid is added to an aqueous solution of ammonia.	Compound <b>H</b> is formed

What are **F**, **G** and **H**?

	Gas <b>F</b>	Gas <b>G</b>	Compound <b>H</b>
a.	Chlorine	Ammonia	Ammonium sulfate
b.	Ammonia	Carbon dioxide	Ammonium sulfate
c.	Carbon dioxide	Ammonia	Ammonium chloride
d.	Ammonia	Carbon dioxide	Ammonium chloride

( )

----- End of Section A -----

**SECTION B (20 MARKS)**

Answer **ALL** questions in this section in the spaces provided.

- B1. (a) Table 1 describes the properties of compounds. Complete Table 1 by writing True **OR** False in the spaces provided. (2 marks)

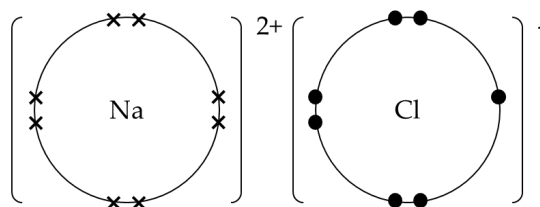
**Table 1**

Properties of compounds	True / False
A compound has a fixed composition.	True
A compound has a fixed melting/boiling point.	
A compound can only be decomposed by a chemical reaction.	

- (b) Sodium chloride and ethene are compounds with different physical and chemical properties. Figures 1 and 2 show the 'dot and cross' diagrams of the outer shell electrons in sodium chloride and ethene. Identify the **TWO** errors in **EACH** figure.

- (i) Sodium chloride (2 marks)

**Figure 1**



× electrons of Na  
● electrons of Cl

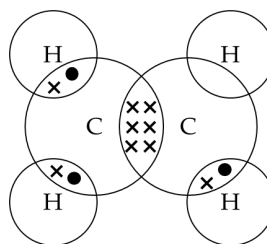
Error 1:

Error 2:

(ii) Ethene

(2 marks)

**Figure 2**



× electrons of C  
● electrons of H

Error 1:

Error 2:

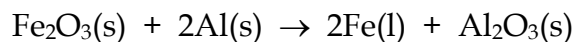
(c) Explain, in terms of structure and bonding, why:

(i) both solid sodium chloride and gaseous ethene do **NOT** conduct electricity. (3 marks)

(ii) molten sodium chloride will conduct electricity.

(1 mark)

- B2. In thermite welding, iron(III) oxide reacts with aluminium according to the following reaction.



- (a) Fine powders of both iron(III) oxide and aluminium are used in this reaction. State the advantage of using reactants in powder form. (1 mark)
- (b) If 9.00 g of iron(III) oxide is reacted with 2.80 g of aluminium, calculate the theoretical yield of molten iron in the reaction. (7 marks)
- (c) Determine the percentage yield if 5.23 g of molten iron is obtained from the reaction. (2 marks)

----- End of Paper -----



## Periodic Table

### The Periodic Table of the Elements

		Group																																																																
I	II	III	IV	V	VI	VII	0																																																											
7 Li lithium 3	9 Be beryllium 4	11 Na sodium 11	12 Mg magnesium 12	13 Al aluminum 13	14 Si silicon 14	15 P phosphorus 15	16 S sulfur 16	17 Cl chlorine 17	18 Ar argon 18	19 K potassium 19	20 Ca calcium 20	21 Sc scandium 21	22 Ti titanium 22	23 V vanadium 23	24 Cr chromium 24	25 Mn manganese 25	26 Fe iron 26	27 Co cobalt 27	28 Ni nickel 28	29 Cu copper 29	30 Zn zinc 30	31 Ga gallium 31	32 Ge germanium 32	33 As arsenic 33	34 Se selenium 34	35 Br bromine 35	36 Kr krypton 36	37 Rb rubidium 37	38 Sr strontium 38	39 Y yttrium 39	40 Zr zirconium 40	41 Nb niobium 41	42 Mo molybdenum 42	43 Tc technetium 43	44 Ru ruthenium 44	45 Rh rhodium 45	46 Pd palladium 46	47 Ag silver 47	48 Cd cadmium 48	49 In indium 49	50 Sn tin 50	51 Sb antimony 51	52 Te tellurium 52	53 I iodine 53	54 Xe xenon 54	55 Cs caesium 55	56 Ba barium 56	57 La lanthanum 57 *	72 Hf hafnium 72	73 Ta tantalum 73	74 W tungsten 74	75 Re rhenium 75	76 Os osmium 76	77 Ir iridium 77	78 Pt platinum 78	79 Au gold 79	80 Hg mercury 80	81 Tl thallium 81	82 Pb lead 82	83 Bi bismuth 83	84 Po polonium 84	85 At astatine 85	86 Rn radon 86	87 Fr francium 87	88 Ra radium 88	89 Ac actinium 89 †
		1 H hydrogen 1											5 B boron 5	6 C carbon 6	7 N nitrogen 7	8 O oxygen 8	9 F fluorine 9	10 Ne neon 10	2 He helium 2																																															

*58-71 Lanthanoid series	140 Ce cerium 58	141 Pr praseodymium 59	144 Nd neodymium 60	150 Sm samarium 62	152 Eu europium 63	157 Gd gadolinium 64	159 Tb terbium 65	162 Dy dysprosium 66	165 Ho holmium 67	167 Er erbium 68	169 Tm thulium 69	173 Yb ytterbium 70	175 Lu lutetium 71
†90-103 Actinoid series	232 Th thorium 90	91 Pa protactinium 91	92 U uranium 92	94 Pu plutonium 94	95 Am americium 95	96 Cm curium 96	97 Bk berkelium 97	98 Cf californium 98	99 Es einsteinium 99	100 Fm fermium 100	101 Md mendelevium 101	102 No nobelium 102	103 Lr lawrencium 103

a = relative atomic mass  
X = atomic symbol  
b = proton (atomic) number