This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Lebanon Evangelical School

for Boys and Girls Loueizeh - Baabda

SE02 Exam

15DEC2025

Do NOT write in this box. Your MARK will be placed here.

Subject :	Chemistry
Class :	9A
Teacher :	Ms. Lea Abdul Khalek
Duration :	1 hour

Calculators are allowed

You are to answer the questions to this exam on : This exam paper

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

Answer ALL questions.

1. (a) Complete the table to show the relative mass and relative charge of a proton, a neutron, and an electron.

(3)

	Proton	Neutron	Electron
Relative mass			1/1840
Relative charge	+ 1		

(b) The symbol for an atom of one isotope of hydrogen is $^{3}_{1}H$

(i) State the number of protons, neutrons, and electrons present in one atom of this isotope. (3)

Number of protons _____

Number of neutrons _____

Number of electrons _____

(ii) What is meant by the term isotopes? (2)

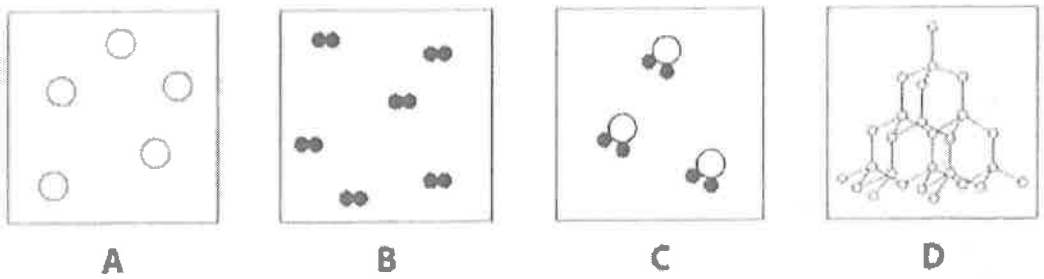
(c) Bromine has two naturally occurring isotopes with mass numbers 79 and 81. A sample of bromine contained the 2 isotopes in the following proportions: (2)

Bromine-79 = 50.7%
Bromine-81 = 49.3%

Use this information to calculate the relative atomic mass of bromine.
Give your answer to **two** decimal places.

(Total for Question 1 = 11 marks)

2. The diagram shows the particles in four substances A, B, C and D.



(a) Which diagram represents a giant covalent structure? (1)

(b) Which diagram shows diatomic molecules? Give an example of an element that's diatomic. (2)

(c) Which diagram shows a compound? Explain how you know. (2)

(d) Magnesium and Oxygen can bond to form magnesium oxide.

i. What is the formula of magnesium oxide? (1)

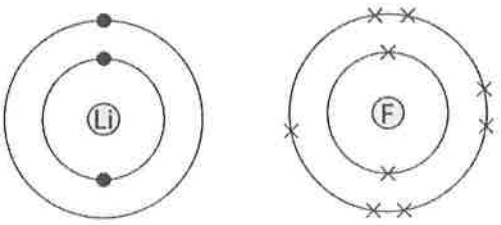
☒ **A** Mg_2O
☒ **B** MgO
☒ **C** MgO_2
☒ **D** Mg_2O_2

ii. Describe, in terms of electron configurations, how magnesium reacts with oxygen to form magnesium oxide. (3)

iii. Explain why the melting point of magnesium oxide would be much higher than the melting point of NaCl. (2)

(Total for Question 2 = 10 marks)

3. Lithium and carbon both form fluorides.
Lithium reacts with fluorine to produce the ionic compound lithium fluoride. The diagrams show the arrangement of electrons in a lithium and fluorine atom.



lithium atom fluorine atom

(a) Draw similar diagrams to show the arrangement of the electrons in the ions formed when lithium reacts with fluorine. Show all the electrons in each ion. (2)

(b) Deduce the formula for lithium fluoride. (1)

(c) Carbon tetrafluoride is a simple molecular compound with the formula CF_4.
Draw a dot and cross diagram to show the arrangement of the electrons in this molecule. Show only the outer electrons. (2)

(d) The table shows some properties of lithium fluoride and carbon tetrafluoride.

Compound	Melting point	Ability to conduct electricity when molten or liquid
lithium fluoride	high	good
carbon tetrafluoride	low	poor

Explain these properties of each compound. (4)

Lithium fluoride:

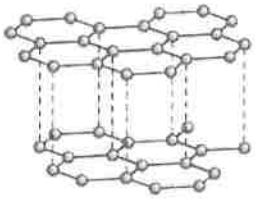
Carbon tetrafluoride:

(Total for Question 3 = 9 marks)

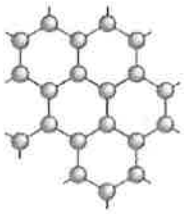
4. The diagram shows three different structures of carbon.



A



B



C

(a) Identify by name each of the above structures. (3)

A: _____

B: _____

C: _____

(b) Explain why structure B conducts electricity while structure A doesn't. (4)

(c) In terms of bonding and structure, give one similarity and one difference between B and C. (2)

Similarity: _____

Difference: _____

(Total for Question 4 = 9 marks)

5. Copper and zinc have some similar properties.

Both metals:

- are malleable
- are ductile
- are good conductors of heat
- are good conductors of electricity
- have high melting points

(a)

(i) Choose 2 properties from the list that make copper a suitable metal for cooking pots. (2)

(ii) Choose 2 properties from the list that make zinc a suitable metal for electrical components. (2)

(iii) Draw a labelled diagram showing the structure of copper. (2)

(iv) By referring to the structure, explain why zinc is ductile. (2)

(b) Brass is an alloy containing copper and zinc. These are 3 differences between brass and pure copper:

- Brass is harder than copper
- Brass has a lower electrical conductivity than copper
- Brass is more resistant to corrosion (rusting) than copper

(i) Use information from the list to suggest why brass is the better material for making door handles. (1)

(ii) Which metal – brass or copper– would be better for making electrical wires? (1)

(iii) In terms of structure, state the difference between brass and copper. (1)

(Total for Question 5 = 11 marks)

TOTAL FOR PAPER = 50 MARKS

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4											11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9	20 **Ne** neon 10
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
39 **K** potassium 19	40 **Ca** calcium 20	45 **Sc** scandium 21	48 **Ti** titanium 22	51 **V** vanadium 23	52 **Cr** chromium 24	55 **Mn** manganese 25	56 **Fe** iron 26	59 **Co** cobalt 27	59 **Ni** nickel 28	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	127 **I** iodine 53	131 **Xe** xenon 54
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **Hf** hafnium 72	181 **Ta** tantalum 73	184 **W** tungsten 74	186 **Re** rhenium 75	190 **Os** osmium 76	192 **Ir** iridium 77	195 **Pt** platinum 78	197 **Au** gold 79	201 **Hg** mercury 80	204 **Tl** thallium 81	207 **Pb** lead 82	209 **Bi** bismuth 83	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	[285] **Cn** copernicium 112	[286] **Uut** ununtrium 113	[289] **Fl** flerovium 114	[289] **Uup** ununpentium 115	[293] **Lv** livermorium 116	[294] **Uus** ununseptium 117	[294] **Uuo** ununoctium 118

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

Relative atomic masses for **Cu** and **Cl** have not been rounded to the nearest whole number.

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(3)

	Proton	Neutron	Electron
Relative mass	1	1	1/1840
Relative charge	+ 1	0	− 1

(b) The symbol for an atom of one isotope of hydrogen is $^{3}_{1}H$

(i) State the number of protons, neutrons, and electrons present in one atom of this isotope. (3)

Number of protons 1

Number of neutrons 2

Number of electrons 1

(ii) What is meant by the term isotopes? (2)

Isotopes are atoms of the same element that have the same number of protons but different number of neutrons.

(c) Bromine has two naturally occurring isotopes with mass numbers 79 and 81. A sample of bromine contained the 2 isotopes in the following proportions: (2)

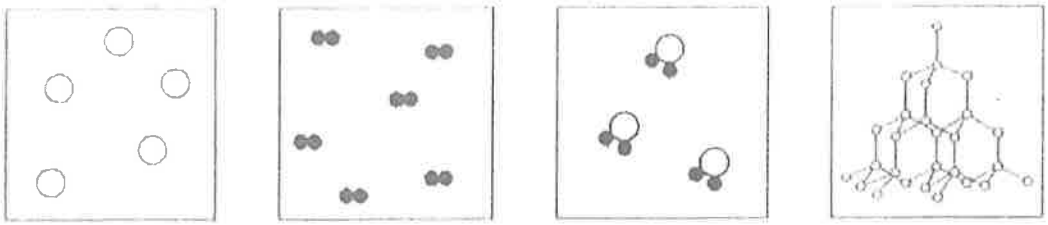
Bromine-79 = 50.7%
Bromine-81 = 49.3%

Use this information to calculate the relative atomic mass of bromine.
Give your answer to **two** decimal places.

$$RAM = \frac{(79 \times 50.7) + (81 \times 49.3)}{100} = 79.99$$

(Total for Question 1 = 11 marks)

2. The diagram shows the particles in four substances A, B, C and D.



A B C D

(a) Which diagram represents a giant covalent structure? (1)

1) D

(b) Which diagram shows diatomic molecules? Give an example of an element that's diatomic. (2)

B. Example: H_2, N_2, O_2

(c) Which diagram shows a compound? Explain how you know. (2)

C. Because it's made up of 2 different elements that are chemically bonded.

(d) Magnesium and Oxygen can bond to form magnesium oxide.

i. What is the formula of magnesium oxide? (1)

- ☒ **A** Mg_2O
- ■ **B** MgO
- ☒ **C** MgO_2
- ☒ **D** Mg_2O_2

ii. Describe, in terms of electron configurations, how magnesium reacts with oxygen to form magnesium oxide. (3)

Mg: 2,8,2 $\longrightarrow$ Mg^{2+}: 2,8

O: 2,6 $\longrightarrow$ O^{2-}: 2,8

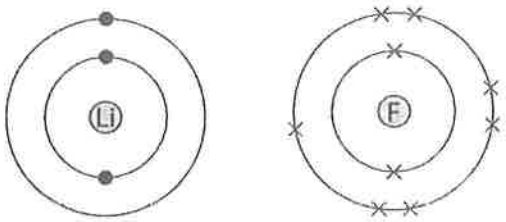
$2e^-$ are transferred from a magnesium atom to an oxygen atom to acheive a noble gas configuration.

iii. Explain why the melting point of magnesium oxide would be much higher than the melting point of NaCl. (2)

In NaCl, one electron is transfered from Na^+ to Cl^-, but in MgO 2 electrons are transferred from Mg^{2+} to O^{2-}, creating significantly stronger electrostatic force, which would require greater energy to break apart.

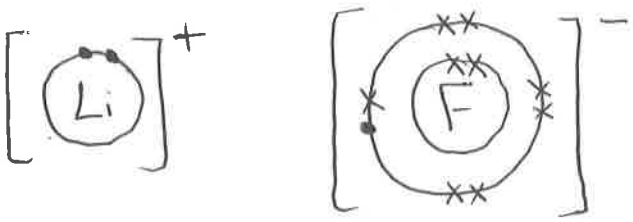
(Total for Question 2 = 10 marks)

3. Lithium and carbon both form fluorides.
Lithium reacts with fluorine to produce the ionic compound lithium fluoride. The diagrams show the arrangement of electrons in a lithium and fluorine atom.



lithium atom fluorine atom

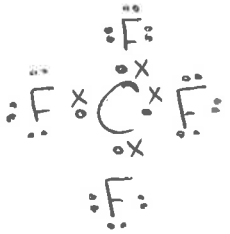
(a) Draw similar diagrams to show the arrangement of the electrons in the ions formed when lithium reacts with fluorine. Show all the electrons in each ion. (2)



(b) Deduce the formula for lithium fluoride. (1)

LiF

(c) Carbon tetrafluoride is a simple molecular compound with the formula CF_4.
Draw a dot and cross diagram to show the arrangement of the electrons in this molecule. Show only the outer electrons. (2)



(d) The table shows some properties of lithium fluoride and carbon tetrafluoride.

Compound	Melting point	Ability to conduct electricity when molten or liquid
lithium fluoride	high	good
carbon tetrafluoride	low	poor

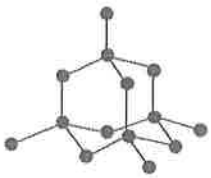
Explain these properties of each compound. (4)

Lithium fluoride: is an ionic compound made of Li^+ and F^- ions arranged in a giant ionic lattice. High melting point indicates strong electrostatic attractions between oppositely charged ions, which requires a lot of energy to overcome.
In the solid state, ions are fixed in position. When molten, ions are free to move, allowing a charge to be carried whenever a potential difference is applied.

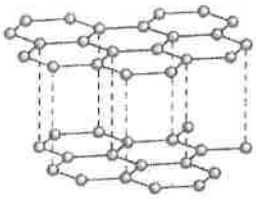
Carbon tetrafluoride: is a simple molecular (covalent) compound made of discrete CF_4 molecules. The forces between the molecules are weak intermolecular forces, so little energy is needed to overcome them, giving it a low melting point. It cannot conduct electricity because it has no free mobile charged particles.

(Total for Question 3 = 9 marks)

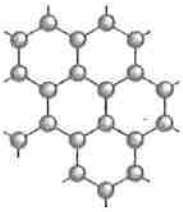
4. The diagram shows three different structures of carbon.



A



B



C

(a) Identify by name each of the above structures. (3)

A: diamond

B: graphite

C: graphene

(b) Explain why structure B conducts electricity while structure A doesn't. (4)

In diamonds, carbon atoms are arranged in a tetrahedral structure, where each carbon atom is covalently bonded to 4 other carbon atoms, leaving no free valence e^- to carry a charge.

In graphite, carbon atoms are arranged in hexagonal layers where each carbon is bonded to 3 other carbon atoms, leaving one free valence e^- that can move around and conduct electricity.

(c) In terms of bonding and structure, give one similarity and one difference between B and C. (2)

Similarity: Both have a giant covalent structure made of carbon atoms arranged in a hexagonal lattice, with each carbon atom is covalently bonded to 3 other carbon atoms.

Difference: Graphite consists of many layers of graphene held together by weak intermolecular forces, whereas graphene is only a single layer of carbon atoms.

(Total for Question 4 = 9 marks)

5. Copper and zinc have some similar properties.

Both metals:

- are malleable
- are ductile
- are good conductors of heat
- are good conductors of electricity
- have high melting points

(a)

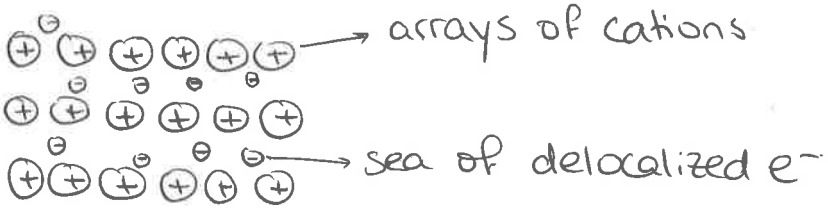
(i) Choose 2 properties from the list that make copper a suitable metal for cooking pots. (2)

It's a good conductor of heat.
It has a high melting point.

(ii) Choose 2 properties from the list that make zinc a suitable metal for electrical components. (2)

It's ductile.
It's a good conductor of electricity.

(iii) Draw a labelled diagram showing the structure of copper. (2)



(iv) By referring to the structure, explain why zinc is ductile. (2)

When an external force is applied, the sea of delocalized electrons prevent the repulsion between the neighboring layers of cations, allowing the layers of zinc ~~atoms~~ ions to slide over each other, without the structure breaking apart.

(b) Brass is an alloy containing copper and zinc. These are 3 differences between brass and pure copper:

- Brass is harder than copper
- Brass has a lower electrical conductivity than copper
- Brass is more resistant to corrosion (rusting) than copper

(i) Use information from the list to suggest why brass is the better material for making door handles. (1)

Brass is harder and more resistant to corrosion than copper.

(ii) Which metal – brass or copper– would be better for making electrical wires? (1)

Copper

(iii) In terms of structure, state the difference between brass and copper. (1)

Brass, unlike copper, is formed of layers of cations of different sizes.

(Total for Question 5 = 11 marks)

TOTAL FOR PAPER = 50 MARKS

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Key

relative atomic mass
atomic symbol
name
atomic (proton) number

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

Relative atomic masses for **Cu** and **Cl** have not been rounded to the nearest whole number.