IGCSE · Cambridge (CIE) · Chemistry

20 mins 20 questions

Multiple Choice Questions

Ions & Ionic Bonds

Ions & Ionic Bonds / Ionic Bonds & Lattice Structure / Properties of Ionic Compounds

Easy (5 questions)	/5
Medium (5 questions)	/5
Hard (10 questions)	/10
Total Marks	**/20**

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Easy Questions

1 What change occurs to an atom when it forms a negative ion?

A. It loses electrons.

B. It gains protons.

C. It gains electrons.

D. It loses protons.

(1 mark)

2 Lithium and chlorine react together to form lithium chloride. During formation, each lithium atom.....**1**..... one .....**2**..... which is completely .....**3**..... to the chlorine atom.

What words correctly fill gaps **1**, **2** and **3**?

	1	2	3
A	gains	electron	shared
B	loses	electron	transferred
C	gains	proton	transferred
D	loses	proton	shared

(1 mark)

3 Which of the statements describes ionic bonding?

A. Electrostatic attraction between atoms

B. Electrostatic attraction between positively charged particles and delocalised electrons

C. Electrostatic attraction between oppositely charged ions

D. Electrostatic attraction between the nuclei of two atoms and a shared pair of electrons

(1 mark)

4 Extended Only

The structure of an ionic compound, sodium chloride, is a lattice structure.

Which of the following statements about an ionic lattice structure is **not** true?

A. There is a regular arrangement of ions in the lattice

B. The layers of ions slide over each other easily in the lattice

C. The ions are arranged with alternating anions and cations

D. Strong electrostatic forces of attraction occur between oppositely charged ions

(1 mark)

5 Extended Only

Magnesium is a **Group II** element and chlorine is a **Group VII** element.

These elements react together to form an ionic compound.

Which row is correct?

	Mg electron change	Mg ion formed	Formula of compound
A	gain	Mg^{2+}	Mg_2Cl
B	gain	Mg^{+}	$MgCl_2$
C	lost	Mg^{2+}	$MgCl_2$
D	lost	Mg^{+}	Mg_2Cl_2

(1 mark)

Medium Questions

1 Which element does not form a stable ion with the same electronic configuration as neon?

A. Magnesium

B. Fluorine

C. Sodium

D. Chlorine

(1 mark)

2 The electronic configuration of an ion was determined to be **2.8.8**.

What could the identity of the ion be?

	Ca^{2+}	S^{2-}
A	×	✓
B	✓	×
C	✓	✓
D	×	×

(1 mark)

3 The table below shows the properties of four substances, **W**, **X**, **Y** and **Z**.

Substance	Melting point	Boiling point	Conducts electricity when	
	/ ºC	/ ºC	solid	liquid
W	3410	5930	yes	yes
X	801	1413	no	yes
Y	3550	4830	no	no
Z	-91	98	no	no

Use the information in the table to identify the substance that is an ionic compound.

A. Substance **W**

B. Substance **X**

C. Substance **Y**

D. Substance **Z**

(1 mark)

4 Extended Only

Calcium reacts with fluorine to form calcium fluoride

Which statement describes what happens to calcium atoms in this reaction?

A. Calcium ions lose electrons to form positive charges. .

B. Calcium atoms gain 3 electrons to form positive ions.

C. Calcium ions gain 2 electrons to form positive ions.

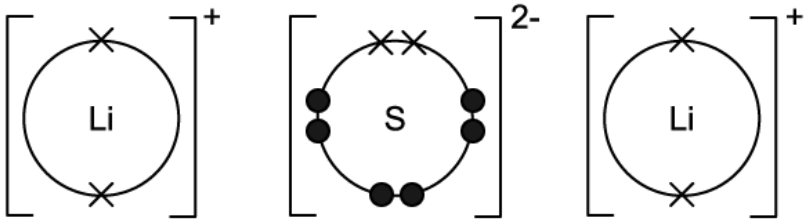
D. Calcium atoms lose 2 electrons to form positive ions.

(1 mark)

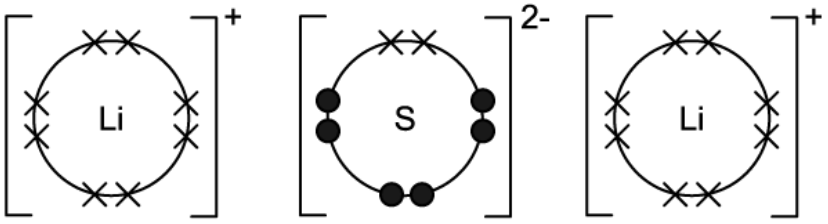
5 Extended Only

Which of the following dot-and-cross diagrams shows the correct arrangement of electrons in lithium sulfide?

A



B



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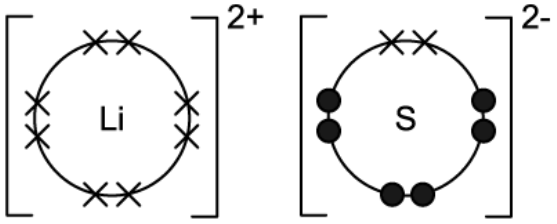
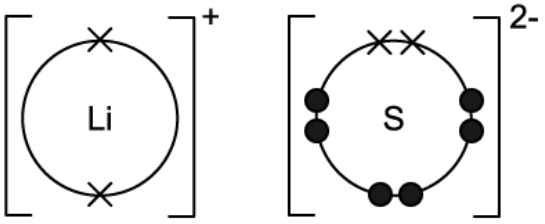


D



(1 mark)

Hard Questions

1 Ionic compounds are formed when a metal reacts with a nonmetal.

Which two elements combine to form this kind of compound?

Element	Electronic structure
Q	2.4
R	2.8
S	2.8.1
T	2.8.7

A. **S** and **T**

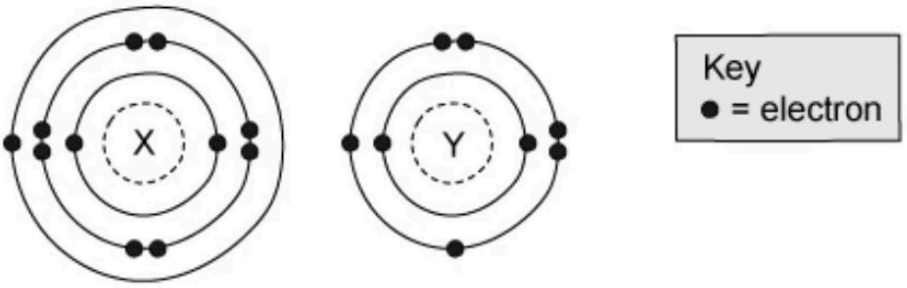
B. **R** and **S**

C. **Q** and **R**

D. **Q** and **T**

(1 mark)

2 The electronic structures of atoms X and Y are shown.



X and Y combine by ionic bonding.

What is the formula of the compound produced?

A. X_2Y

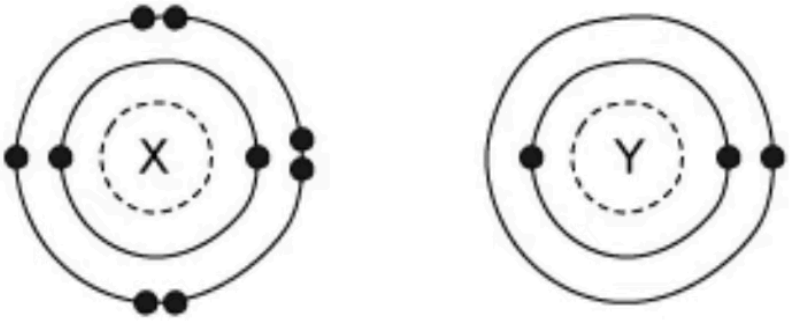
B. X_2Y_2

C. X_2Y_4

D. XY

(1 mark)

3 The electronic structures of atoms **X** and **Y** are shown.



X and **Y** combine by ionic bonding.

What is the formula of the compound produced?

A. X_2Y

B. X_2Y_2

C. X_2Y_4

D. XY

(1 mark)

4 Ionic compounds are formed when metals react with nonmetals.

Which row correctly describes the electron transfer when an ionic bond is formed and the nature of the bond?

	Electron transfer	**Nature of bond**
A	Metal to nonmetal	Opposite ions attract
B	Metal to nonmetal	Opposite ions repel
C	Metal to metal	Same ions repel
D	Nonmetal to metal	Opposite ions attract

(1 mark)

5 Ionic compounds are formed when a metal reacts with a nonmetal.

Which two elements combine to form this kind of compound?

Element	Electronic structure
Q	2.8.8.1
R	2.8.7
S	2.8.4
T	2.8.8

A. **Q** and **T**

B. **Q** and **R**

C. **R** and **S**

D. **S** and **T**

(1 mark)

6 Potassium and bromine chemically combine to form the compound potassium bromide.

During formation, each bromine atom.....**1**..... one electron which is completely .....**2**..... from the outer shell of the potassium atom. The .....**3**..... force of attraction is formed from the attraction between the opposite charges on each ion.

What words correctly fill gaps **1**, **2** and **3**?

	1	2	3
A	loses	shared	electrical
B	loses	transferred	intermolecular
C	gains	shared	electrostatic
D	gains	transferred	electrostatic

(1 mark)

7 The table below shows four different substances.

Which substance does the type of bonding shown not match?

	Substance	**Type of bonding present**		
		Ionic	Covalent	Metallic
A	Fluorine		✓	
B	Potassium chloride	✓		
C	Beryllium		✓	
D	Sodium bromide	✓		

(1 mark)

8 Extended Only

The bonding present in a substance determines the structure and properties of that substance.

Which of the following statements is a correct description of the structure of an ionic compound?

A. A lattice structure with an irregular arrangement of alternating positive and negative ions

B. A lattice structure with a regular arrangement of alternating positive and negative ions

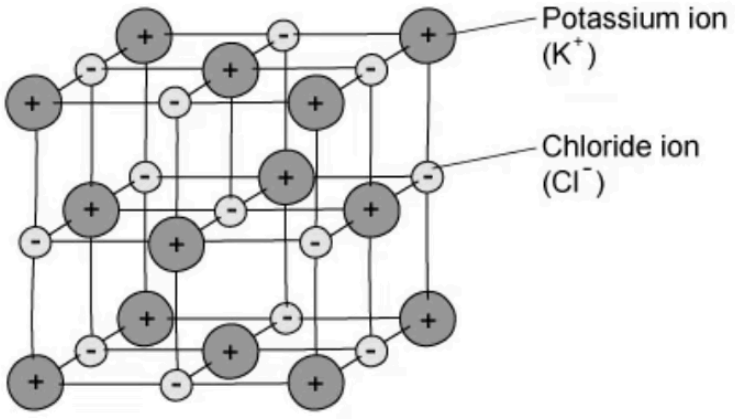
C. A random structure with a regular arrangement of alternating positive and negative ions

D. A random structure with an irregular arrangement of alternating positive and negative ions

(1 mark)

9 Extended Only

The ionic lattice structure of potassium chloride is shown below.



Which of the following statements best describes the bonding and structure of **KC*l***?

A. A small lattice structure held together by electrostatic forces between oppositely charged ions which act in all directions.

B. A small lattice structure held together by electrostatic forces between like charged ions which act in all directions.

C. A giant lattice structure held together by electrostatic forces between oppositely charged ions which act in all directions.

D. A giant lattice structure held together by electrostatic forces between oppositely charged ions which act in one direction only.

(1 mark)

10 Extended Only

A student analysed an ionic compound and a covalent compound using a melting point apparatus. She found the ionic compound had a much higher melting point than the covalent compound.

Which statement explains this observation?

A. Ionic compounds are formed from metals only.

B. Ionic compounds are formed from nonmetals and nonmetals.

C. There are strong electrostatic forces of attraction in ionic compounds.

D. There are strong intermolecular forces in ionic compounds.

(1 mark)