

AQA, OCR, Edexcel

GCSE Science

GCSE Chemistry

**Chemical Bonds - Ionic
Answers**

M M E

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Total Marks: /41

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Chemical Bonds

Q1: What are the three types of chemical bonds?

A= Ionic, covalent and metallic.

(3 marks)

Q2: Describe each of the three types of bonds in terms of ions and electrons.

A= Ionic occurs between oppositely charged ions (1 mark). In covalent bonding, the atoms share electrons (1 mark) and in metallic bonds, the atoms share delocalised electrons (1 mark).

(3 marks)

Q3: When and where does each type of chemical bond occur?

A= Ionic occurs between metals and non-metals (1 mark). Covalent occurs between non-metallic elements and in compounds of non-metals (1 mark). Metallic bonding is in metallic elements and alloys (1 mark).

(3 marks)

Ionic Bonds

Q4: What is an ion?

A= An ion is atom that loses or gains an electron and therefore has a positive or negative charge.

(1 mark)

Q5: Describe what has to happen for metals and non-metals to become ions.

Metals: A= They lose an electron and have a positive charge (1 mark).

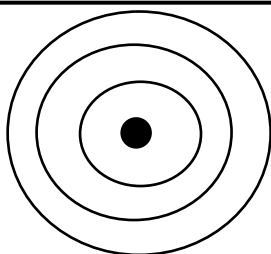
Non-metals: A= They gain an electron and have a negative charge (1 mark).

(2 marks)

Q6: Choose an element from group 1 or 2 and draw its original electron arrangement. Then, draw its electron arrangement once it has become an ion.

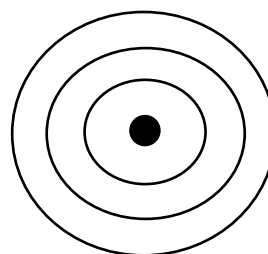
Element

Element: Any group 1 or 2 element (1 mark)
Number of electrons: Electrons according to atomic number (1 mark).



Ion

Element: Any group 1 or 2 element (1 mark)
Number of electrons: Electron number should be one or two fewer than previously. (1 mark).



A= Complete electron arrangement. 2 in 1st shell, (1 mark)
up to 8 in 2nd and 3rd. Outermost shell should have one or two electron. (1 mark)

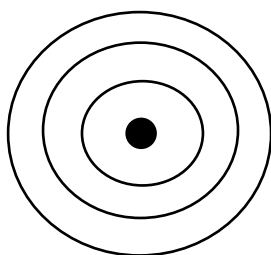
A= Show a full outer electron shell.

(6 marks)

Q7: Now do the same for an element in group 6 or 7.

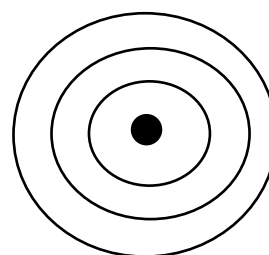
Element

Element: Any group 6 or 7 element (1 mark).
Number of electrons: Electrons according to atomic number (1 mark).



Ion

Element: Any group 1 or 2 element (1 mark)
Number of electrons: Electron number should be one or two more than previously. (1 mark).



A= Electron arrangement. 2 in 1st shell up to 8 in (1 mark)
2nd and 3rd. Outermost shell, should have 6 or 7 electrons (1 mark).

A= Show a full outer electron shell. (1

(6 marks)

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Q8: Which group of elements have a full outer shell?

A= The noble gases.

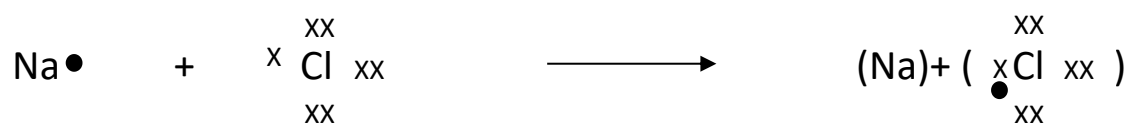
(1 mark)

Q9: What occurs when a metal forms an ionic bond with a non-metal?

A= Electrons in the outer shell are transferred. The metal atoms lose an electron (1 mark) and the non-metal atoms gain one (1 mark).

(2 marks)

Q10: The electrons in the outer shell of a metal can be represented as dots. The electrons in the outer shell of a non-metal, crosses. Draw a dot and cross diagram to represent an ionic compound. NaCl is given as an example.



(4 marks)

Q11: Describe how the charge of an ion relates to its element's group in the periodic table.

A= The number of charge is the group number of the element.

(2 marks)

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Ionic compounds

Q12: An ionic compound is a giant structure of ions. Describe how it is held together.

A= Ionic compounds are held together by strong electrostatic forces of attraction (1 mark) between oppositely charged ions (1 mark). These forces of attraction act in all directions (1 mark).

(3 marks)

Q13: Discuss the properties of a giant ionic lattice.

A=

They have high melting points and high boiling points

This is because of large amounts of energy needed to break the many strong bonds

(3 marks)

Q14. When melted or dissolved in water, ionic compounds conduct electricity. Describe how this occurs.

A= The ions are free to move (1 mark) and so charge can flow (1 mark).

(2 marks)