Answer all the questions below then check your answers.

1. Which of the following best describes ionic bonding?

a) The sharing of electrons between atoms.

b) The transfer of electrons from one atom to another.

c) The attraction between two non-metals.

d) The sharing of protons between atoms.

2. When a sodium atom loses one electron, it forms a:

a) Negative ion with a charge of -1 b) Positive ion with a charge of +1

c) Neutral atom d) Positive ion with a charge of +2

3. Which of the following ions will have the same electron configuration as neon (Ne)?

a) Na^+ b) Cl^- c) O^{2-} d) All of the above

4. Fill in the gap to complete the sentences below:

a. Ionic bonds form between a _____ and a _____.

b. An atom of chlorine gains one electron to form a _____ ion with a charge of _____.

c. In an ionic bond, the metal _____ electrons and becomes a _____ ion, while the non-metal _____ electrons and becomes a _____ ion.

5. Match the following ions with their correct charges:

ions
Mg
O
Na
Cl

Correct charge
1^+
2^+
2^-
1^-

6. Match the element with the correct ion formed:

element
potassium
sulfur
chlorine
oxygen

Ion formed
O^{2-}
Cl^-
K^+
S^{2-}

7. Explain how ionic bonding occurs between sodium (Na) and chlorine (Cl).

8. Using dot and cross diagrams, show the formation of magnesium oxide.

9. Why do elements form ions? Relate your answer to the octet rule.

10. State the difference between a cation and an anion, and give an example of each.

Answers:

1. Which of the following best describes ionic bonding?

a) The sharing of electrons between atoms.

b) The transfer of electrons from one atom to another.

c) The attraction between two non-metals.

d) The sharing of protons between atoms.

Answer: B) The transfer of electrons from one atom to another.

2. When a sodium atom loses one electron, it forms a:

a) Negative ion with a charge of -1

b) Positive ion with a charge of +1

c) Neutral atom

d) Positive ion with a charge of +2

Answer: B) Positive ion with a charge of +1

3. Which of the following ions will have the same electron configuration as neon (Ne)?

a) Na^+ b) Cl^- c) O^{2-} d) All of the above

Answer: D) All of the above

4. Fill in the gap to complete the sentences below:

a. Ionic bonds form between a _____ and a _____.

Answer: metal, non-metal

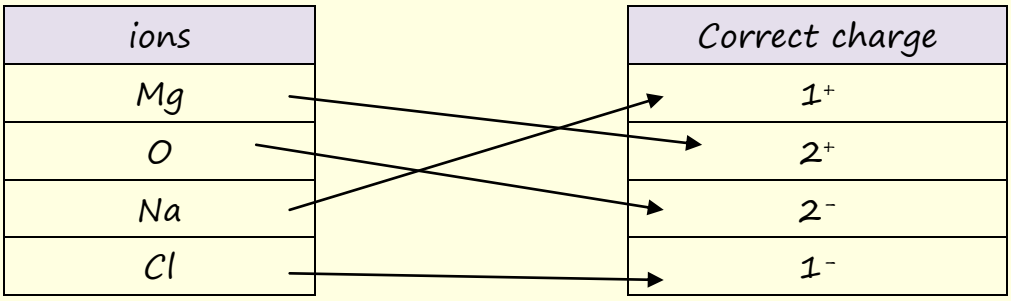
b. An atom of chlorine gains one electron to form a _____ ion with a charge of _____.

Answer: chloride, -1

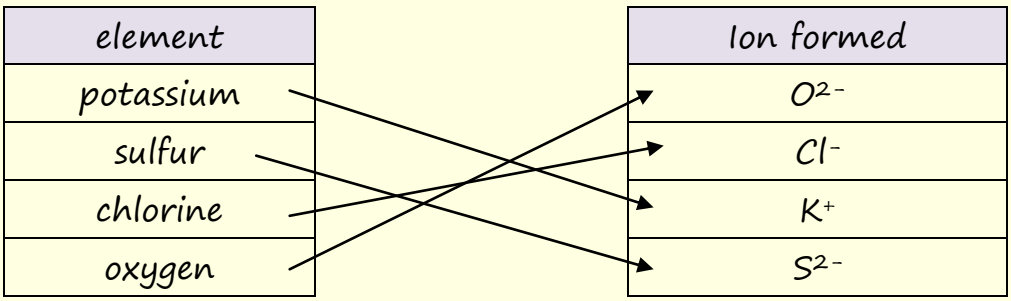
c. In an ionic bond, the metal _____ electrons and becomes a _____ ion, while the non-metal _____ electrons and becomes a _____ ion.

Answer: loses, positive, gains, negative

5. Match the following ions with their correct charges:



6. Match the element with the correct ion formed:



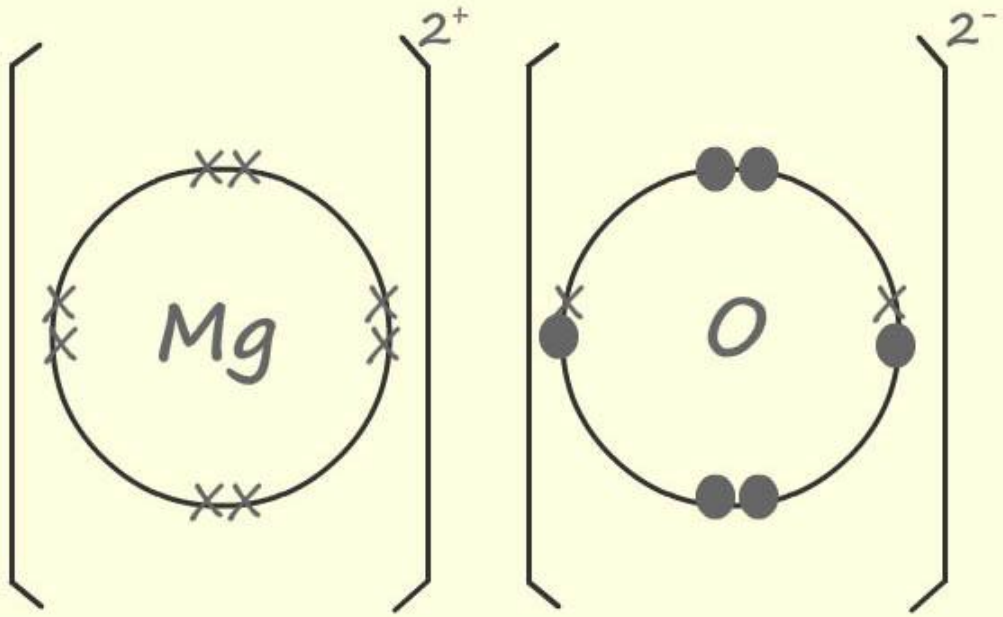
7. Explain how ionic bonding occurs between sodium (Na) and chlorine (Cl).

Answer: Ionic bonding between sodium and chlorine occurs when sodium loses one electron to achieve a stable electron configuration (similar to neon), becoming a Na^+ ion. Chlorine gains this electron to achieve a stable electron configuration

(similar to argon), becoming a Cl^- ion. The opposite charges of the Na^+ and Cl^- ions attract, forming an ionic bond, resulting in the compound NaCl.

8. Using dot and cross diagrams, show the formation of magnesium oxide.

Answer:



Magnesium (Mg) has the electron configuration 2, 8, 2.

Oxygen (O) has the electron configuration 2, 6.

Magnesium loses two electrons to form a Mg^{2+} ion, and oxygen gains these two electrons to form an O^{2-} ion.

The dot and cross diagram will show:

Mg with no outer electrons (represented by dots or crosses) and a charge of 2^+.

O with a full outer shell (8 electrons, with 2 additional electrons represented by crosses if magnesium's electrons are shown as dots) and a charge of 2^-.

9. Why do elements form ions? Relate your answer to the octet rule.

   Answer: Elements form ions to achieve a stable electron configuration, often referred to as the "octet rule." This rule states that atoms are most stable when they have eight electrons in their outermost shell, similar to the noble gases. Metals tend to lose electrons to achieve a full outer shell, forming positive ions (cations), while non-metals gain electrons to complete their outer shell, forming negative ions (anions). This transfer of electrons leads to the formation of ions and the stabilisation of atoms.

10. State the difference between a cation and an anion, and give an example of each.

    Answer: A cation is a positively charged ion that forms when an atom loses one or more electrons. An example is Na^+. An anion is a negatively charged ion that forms when an atom gains one or more electrons. An example is Cl^-.