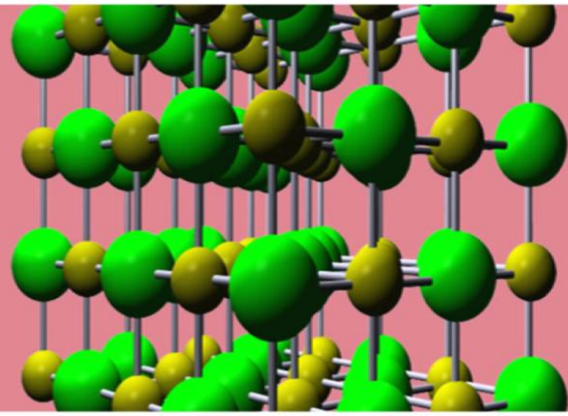
The Properties of Ionic Compounds

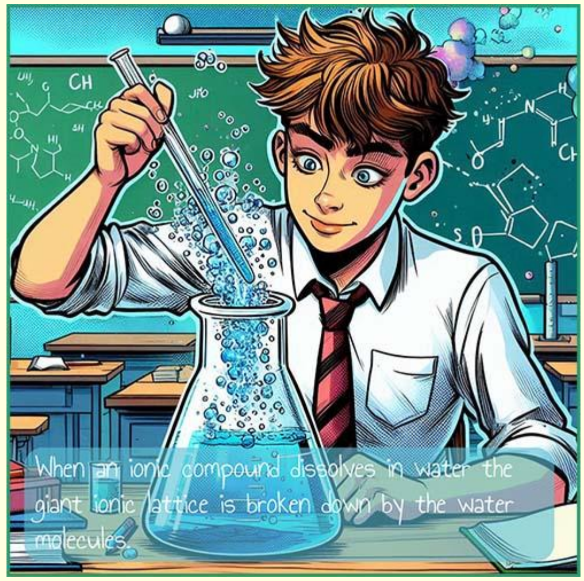


Answer the questions below then check your answers.

1. Which of the following ionic compounds is soluble in water?

a) Silver chloride b) Sodium chloride

c) Calcium carbonate d) Lead sulfate



2. What is the term used to describe a substance that conducts electricity when molten or dissolved in water?

a) Insulator b) Conductor

c) Electrolyte d) Semiconductor

3. Fill in the gap to complete the sentence below:

a. Ionic compounds are typically ___________________ because their ions are arranged in a rigid lattice structure and when these ions move due to any applied forces the lattice structure can crack.

4. Why do ionic compounds conduct electricity when molten but not when solid?

5. Explain what is meant by the term 'electrolyte'.

6. Match the following ionic compounds to their solubility in water:

Ionic compound
Sodium sulfate
Silver chloride
Magnesium nitrate

Solubility in water
Soluble
Soluble
insoluble

7. Describe how water molecules are able to break up an ionic lattice when an ionic compound dissolves.

8. Explain why ionic compounds are brittle.

9. Describe the process of ion migration when an ionic compound is dissolved in water and an electric field is applied.

10. Fill in the gaps to complete the sentences below:

a. The ability of a substance to conduct electricity in molten or dissolved form is due to the presence of ______________________________.

b. In an ionic lattice, the ions are held together by e_________________ forces between the positive and negative ions.

11. Which of the following statements is true about the solubility of ionic compounds in water?

a) All ionic compounds are soluble in water.

b) Ionic compounds that dissolve in water do so because water molecules are non-polar.

c) Ionic compounds dissolve in water due to the interaction between water molecules and the ions in the compound.

d) Water cannot dissolve any ionic compounds.

12. Which of the following describes why solid ionic compounds do not conduct electricity?

a) The ions are not charged.

b) The ions are free to move.

c) The ions are in fixed positions within the lattice.

d) The ions are non-polar.

13. Explain the difference between an ionic compound and a covalent compound, giving examples of each. Include information about their structure, bonding, and properties.

Answers

1. Which of the following ionic compounds is soluble in water?

   a) Silver chloride   b) Sodium chloride

   c) Calcium carbonate   d) Lead sulfate

   Answer: b) Sodium chloride

2. What is the term used to describe a substance that conducts electricity when molten or dissolved in water?

a) Insulator   b) Conductor   c) Electrolyte   d) Semiconductor

Answer: c) Electrolyte

3. Fill in the gap to complete the sentence below:

a. Ionic compounds are typically ___________________ because their ions are arranged in a rigid lattice structure and when these ions move due to any applied forces the lattice structure can crack.

Answer: brittle

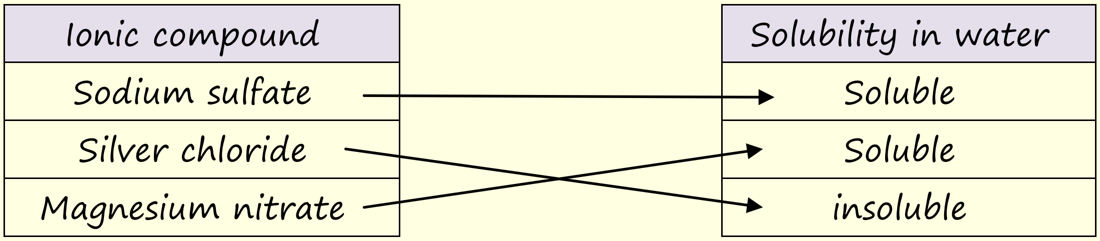
4. Why do ionic compounds conduct electricity when molten but not when solid?

Answer: Ionic compounds conduct electricity when molten because the ions are free to move. In the solid state, ions are fixed in place in the lattice, so they cannot carry a charge.

5. Explain what is meant by the term 'electrolyte'.

Answer: An electrolyte is a substance that conducts electricity when dissolved in water or when molten, because it contains free-moving ions.

6. Match the following ionic compounds to their solubility in water:



7. Describe how water molecules are able to break up an ionic lattice when an ionic compound dissolves.

Answer: Water molecules are able to interact or form intermolecular bonds with the positive and negative ions in the ionic lattice. The water molecules surround and separate the ions, overcoming the electrostatic forces holding the lattice together, which causes the ionic compound to dissolve.

8. Explain why ionic compounds are brittle.

Answer: Ionic compounds are brittle because the ions in the lattice are arranged in a specific pattern. When a force is applied, it can cause the layers of ions to shift. If like-charged ions are forced to align with each other, they repel strongly, causing the lattice to shatter or crack.

9. Describe the process of ion migration when an ionic compound is dissolved in water and an electric field is applied.

Answer: When an ionic compound dissolves in water, the ions separate and become free to move. When an electric field is applied, these ions migrate toward the electrodes: positive ions (cations) move toward the negative electrode (cathode), and negative ions (anions) move toward the positive electrode (anode). This movement of ions is what allows the solution to conduct electricity.

10. Fill in the gaps to complete the sentences below:

a. The ability of a substance to conduct electricity in molten or dissolved form is due to the presence of ______________________________.

Answer: free-moving ions

b. In an ionic lattice, the ions are held together by e_________________ forces between the positive and negative ions.

Answer: electrostatic

11. Which of the following statements is true about the solubility of ionic compounds in water?

a) All ionic compounds are soluble in water.

b) Ionic compounds that dissolve in water do so because water molecules are non-polar.

c) Ionic compounds dissolve in water due to the interaction between water molecules and the ions in the compound.

d) Water cannot dissolve any ionic compounds.

Answer: c) Ionic compounds dissolve in water due to the interaction between water molecules and the ions in the compound.

12. Which of the following describes why solid ionic compounds do not conduct electricity?

a) The ions are not charged.

b) The ions are free to move.

c) The ions are in fixed positions within the lattice.

d) The ions are non-polar.

Answer: c) The ions are in fixed positions within the lattice.

13. Explain the difference between an ionic compound and a covalent compound, giving examples of each. Include information about their structure, bonding, and properties.

Answers will vary but should include:

Ionic compounds are formed from metal and non-metal elements, while covalent compounds are formed from non-metal elements.

Ionic compounds have giant ionic lattices, while covalent compounds can be simple molecules or giant covalent structures.

Ionic bonds involve transfer of electrons, while covalent bonds involve sharing of electrons.

Ionic compounds have high melting and boiling points, are often soluble in water, and conduct electricity when molten or dissolved. Covalent compounds have low melting and boiling points, are often insoluble in water, and do not conduct electricity.