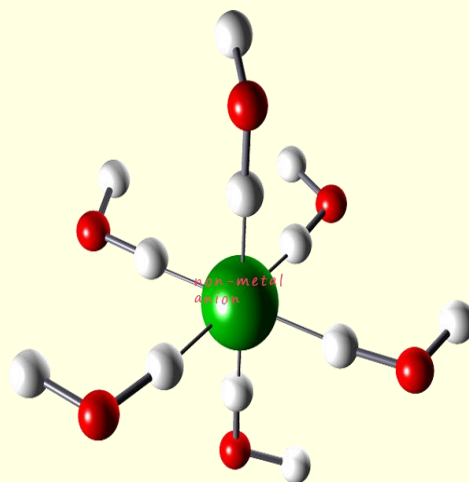
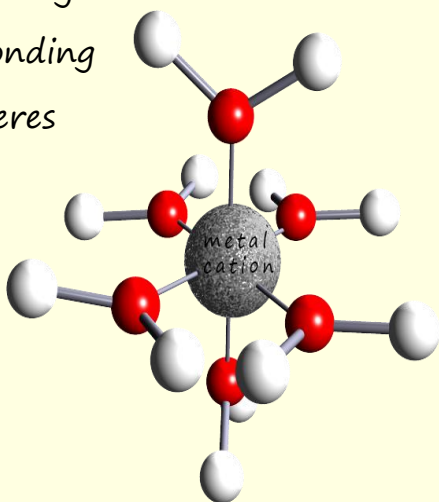


Properties of ionic compounds

Answer the questions below then check your answers.

1. What are anions and cations?
2. What type of structure do ionic compounds have?
3. Do ionic compounds have high or low melting points? Explain your answer
4. Explain why molten lead bromide conducts electricity but solid lead bromide does not.
5. Use the image below to explain and describe what happens to an ionic compound when it dissolves in water. You should mention:
 - Hydrogen bonding
 - Coordinate bonding
 - Solvation spheres



5b. Why do you think ionic compounds do not dissolve in organic solvents?

6. The table below shows the melting points of 4 ionic compounds.

Ionic compound	Melting point/ $^{\circ}\text{C}$
lithium oxide ($\text{Li}_2^+\text{O}^{2-}$)	1432
Sodium oxide ($\text{Na}_2^+\text{O}^{2-}$)	1132
Magnesium oxide ($\text{Mg}^{2+}\text{O}^{2-}$)	2852
Calcium oxide ($\text{Ca}^{2+}\text{O}^{2-}$)	2572

- Why do you think the melting points of magnesium oxide and calcium oxide are much higher than that of lithium and sodium oxide?
- Based on your answer to a, do you think the melting point of aluminum oxide is higher or lower than that of calcium and magnesium oxide? Explain your decision.

Properties of ionic compounds

Answers

1. What is an ionic compound? *Compound made up positively charged metal ions and negatively charged non-metal ions*

2. What type of structure do ionic compounds have? *Giant ionic lattice.*

3. Do ionic compounds have high or low melting points. Explain your answer

High melting points due to the fact they have giant structures with lots of strong bonds present, so lots of energy is required to break these bonds so that the ions can move freely and enter the liquid state.

4. What must be done to an ionic compound to make it conduct electricity?

Must be dissolved or melted, in both cases the lattice structure breaks down and the ions are free to move. It will now conduct an electric current.

5. Why do solid ionic compounds not conduct electricity?

The ions are not free to move, held in place within a giant ionic lattice. As in any solid they only vibrate about fixed positions.

6. Use the image below to explain and describe what happens to an ionic compound when it dissolves in water.

The water molecules pull apart the giant ionic lattice and separate the ions out evenly throughout the water to form a solution of ions that are free to move. This solution is called an electrolyte and it will conduct electricity.

7. Why do molten and solutions of ionic compound conduct electricity?

The ions present are free to move, giant lattice structure has been broken down.

8. What are anions and what are cations?

Anions go to the anode, they are negatively charged ions, they are non-metal ions

cations go to the cathode, they are positively charged ions, they are metal ions

9. The table below shows the melting points of 4 ionic compounds.

Ionic compound	Melting point/ $^{\circ}\text{C}$
lithium oxide ($\text{Li}_2^+ \text{O}^{2-}$)	1432
Sodium oxide ($\text{Na}_2^+ \text{O}^{2-}$)	1132
Magnesium oxide ($\text{Mg}^{2+} \text{O}^{2-}$)	2852
Calcium oxide ($\text{Ca}^{2+} \text{O}^{2-}$)	2572

a. Why do you think the melting points of magnesium oxide and calcium oxide are much higher than that of lithium and sodium oxide?

Magnesium and calcium are in group 2 of the periodic table, they form ions with a 2^+ charge, Mg^{2+} and Ca^{2+} . Li and Na are in group 1 of the periodic table so form ions with a 1^+ charge. Oxide ions are O^{2-} . So magnesium and calcium ions will be more strongly attracted to the O^{2-} , oxide ion due to the fact they both have a charge of 2. Sodium and lithium will be less strongly attracted as these ions only have a 1^+ charge. Larger charges means stronger bonds, which means more energy required to break up the lattice, so higher melting point.

b. Based on your answer to a, do you think the melting point of aluminum oxide is higher or lower than that of calcium and magnesium oxide? Explain your decision.

Aluminium is in group 3 of the periodic table, so ions will be Al^{3+} , these ions should form very strong bonds to the oxide ions, O^{2-} , so melting point should be higher due to attraction of a 3^+ charge to a 2^- charge would be stronger than that of a 2^+ charge to a 2^-

Note: if you google the melting point of aluminium oxide you will see it is 2072°C . lower than you probably expected, obviously there are other factors at play here.....!