

Properties of Ionic Compounds Practice

- 1) Explain why ionic compounds have such high melting and boiling points when compared with covalent compounds.

- 2) Why do ionic compounds conduct electricity when dissolved in water, but not when the solid state?

- 3) Explain what a unit cell is.

- 4) Why do ionic compounds tend to be brittle?

- 5) Describe whether the following compounds are likely to be ionic or not ionic based on the properties given. Explain your reasoning, referring to each piece of evidence.
 - Compound 1 has a melting point of 45 degrees Celsius and dissolves well in water.

 - Compound 2 is a brittle material that can be used to make electrical wires.

 - Compound 3 is a gelatinous material that is formed when two other materials are combined in a crucible.

Properties of Ionic Compounds Answers

- 1) Explain why ionic compounds have such high melting and boiling points when compared with covalent compounds.

The charges on the ions in ionic compounds cause the cations and ions to be tightly bound to one another. Additionally, when you stack these ions together in a crystal, they tend to form an arrangement where the cations are surrounded by anions and the anions are surrounded by cations, causing each of them to be locked tightly in place.

- 2) Why do ionic compounds conduct electricity when dissolved in water, but not when the solid state?

For electricity to be conducted, one of two things needs to happen. The first is that electrons need to move from one place to another – this is what happens in metals. The second is that ions need to move from one place to another – this only happens when you melt or dissolve an ionic compound because when it is in its solid state the ions are locked tightly in place.

- 3) Explain what a unit cell is.

A unit cell is the simplest subunit of a crystal that, when stacked up over and over again, will give the entire structure of the whole crystal.

- 4) Why do ionic compounds tend to be brittle?

Brittle means “will shatter when you bash it with something.” Ionic compounds are brittle because the ions are locked tightly into a very stable framework – when you disrupt this framework, the stability gained from having so many +/- interactions is disrupted, and in any place where it no longer exists the crystal will fracture.

- 5) Describe whether the following compounds are likely to be ionic or not ionic based on the properties given. Explain your reasoning.

- Compound 1 has a melting point of 45 degrees Celsius and dissolves well in water. **Not ionic. The melting point is too low for it to be ionic. Incidentally, the fact that it dissolves well in water is irrelevant.**
- Compound 2 is a brittle material that can be used to make electrical wires. **Not ionic. Ionic compounds only conduct electricity when melted or dissolved.**

- Compound 3 is a gelatinous material that is formed when two other materials are combined in a crucible. **Not ionic. Ionic compounds are crystalline, not gelatinous.**

