

*Properties of  
Ionic and Metallic Compounds*



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*Properties of Ionic Compounds*

- A bond between a metal and a non-metal
- A regular repeating arrangement of ions which lead to a crystalline solid with a rigid structure
- Ions are strongly bonded together.
- High melting points
- High conductivity when melted or dissolved

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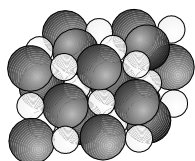
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*Crystalline structure*



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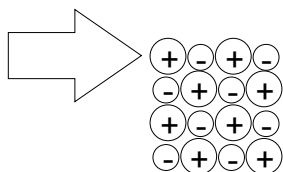
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### *Ionic solids are brittle*



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### *Why must they be melted or dissolved to conduct electricity?*

- Conducting electricity requires moving charges – the electrons must move around.
- In an ionic bond, the ions are locked in place so they make good insulators.
- When melted, the ions can move around and they can conduct electricity
  - ◆ NaCl: must get to about 800 °C.
- Dissolved in water they conduct (aqueous) because the ions disassociate  $\text{NaCl} \rightarrow \text{Na}^+ + \text{Cl}^- + \text{H}_2\text{O}$

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### *Metallic Bonds*

- Metals hold on to their valence electrons very weakly.
- Think of them as positive ions (cations) floating in a sea of electrons

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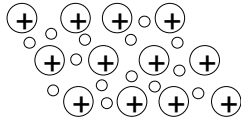
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### Sea of Electrons

- Electrons are free to move through the solid.



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### Metals are Malleable

- High Melting Point and High Boiling Point
- Metals conduct electricity.
- Metals are Malleable. They can be hammered into shape (bend).
- Metals are Ductile - drawn into wires.
- Both malleability and ductility explained in terms of the mobility of the valence electrons

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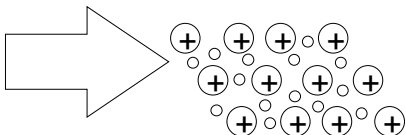
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### Malleable



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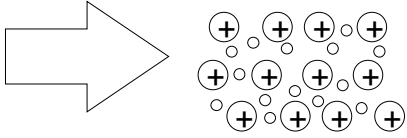
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## Malleable

- Electrons allow atoms to slide by.



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