Characteristics of Ionic Bonds

Concepts:

Chemical bonds, structure-property relationships, ionic bonds, physical properties of materials

Use the recommendations below to increase and/or decrease the challenge difficulty for your students.

Short-on-time Inquiry Lab:

Students follow a detailed procedure to identify which of a set of four compounds are ionic in character. Students must conduct melting point measurements as well as observe solubility trends. Students must answer questions that probe their understanding of how a compound's bond strength influences its physical properties. (30 min.)

Guided Inquiry Lab:

Students follow a detailed procedure to identify which of a set of eight compounds are ionic in character. Students must conduct melting point measurements as well as observe solubility trends. Students must answer questions that probe their understanding of how a compound's bond strength influences its physical properties. (50 min.)

Open Inquiry Lab:

Students must develop a procedure to determine the relative strengths of the chemical bonds or interparticle forces in each of four compounds. Students must answer questions that probe their understanding of how a compound's bond strength influences its physical properties. (50 – 90 min.)

Advanced Inquiry Lab:

Students must develop a procedure to determine the relative strengths of the chemical bonds or interparticle forces in each of four compounds. Students' procedure must include a conductivity test that controls for the fact that as the number of particles in a solution increases the conductivity can increase. Students must answer questions that probe their understanding of how a compound's bond strength influences its physical properties. (60 – 90 min.)

Outcomes:

Students come to understand that a material's physical properties, such as melting point, are linked to the material's structure and bonding. Moreover, ionic bonds tend to be strong and so ionic compounds tend to melt at relatively high temperatures.

Associated Phenomena:

What distinguishes one mineral from another?

Standards

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.	The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms.	Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

Performance Expectations

HS-PS1-3: Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.