Name _____

Charged Up Chemistry: Exploring Ions and Ionic Compounds

Open-Ended Response Answer Key

1. The attraction between cations (positively charged ions) and anions (negatively charged ions) in an ionic compound is similar to how magnets attract each other because both involve opposite charges attracting each other. Just as the north pole of a magnet is attracted to the south pole of another magnet, cations are attracted to anions due to their opposite electric charges. This attraction is a fundamental force that holds ionic compounds together, much like the magnetic force between magnets.
2. Knowing about ionic compounds' conductivity is essential in scenarios like designing batteries or fuel cells. In these situations, understanding how ions move in an electrolyte is crucial for optimizing the efficiency and performance of the energy storage or conversion device. By controlling the conductivity of the electrolyte, engineers can enhance the overall functioning of these devices, leading to longer-lasting batteries and more efficient energy conversion.
3. Ionic compounds have several properties that make them suitable for various applications. For example, their solubility in water makes them useful in the pharmaceutical industry for creating soluble medications. Additionally, their conductivity properties are vital in applications like electrolysis for metal production and in healthcare for conducting electrical impulses in the body, such as in ECG or EEG tests. The ability of ionic compounds to form stable crystalline structures also contributes to their use in ceramics and as catalysts in chemical reactions.
4. Using ionic compounds like calcium chloride to melt ice on roads during winter has both benefits and drawbacks. The benefits include enhanced road safety by reducing the risk of accidents caused by icy conditions. However, there are environmental concerns. Calcium chloride can contribute to soil and water pollution when it washes off roads and into nearby ecosystems. This can harm aquatic life and vegetation. Additionally, the corrosion of vehicles and infrastructure due to the use of de-icing agents like calcium chloride poses economic and environmental challenges. Therefore, there is a need for careful management and consideration of alternatives to minimize the environmental impact of these compounds.