

The Effect of Road Salts (MgCl₂, NaCl) Concentration on Heartrate and Mortality in Daphnia Magna using Bioassay

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Road salts, commonly sodium chloride (NaCl) and magnesium chloride (MgCl₂), are frequently used for de-icing roads during the winter. However, these salts often find their way into watersheds and accumulate in lakes, increasing their salinity and pose a significant threat to aquatic ecosystems. Daphnia Magna, a species of zooplankton, are widely used as bioindicators in ecotoxicology studies because of their high sensitivity and transparent body structure. By subjecting Daphnia to 12 solutions varying in salt concentration (across MgCl₂ and NaCl) and recording their mortality and heartrate at four-time intervals, it becomes possible to establish salt concentration thresholds and the LD50 to determine the levels that cause significant harm to them and model ecosystems. The relationship between increasing concentrations of road salts and mortality rates was found to be statistically significant ($P < 0.01$), as well as the time in minutes and percent mortality ($P = 0.05$). The concentration of each salt type also had a statistically significant relationship with the heart rate in beats per minute ($p < 0.01$). When examining the differences in salt types, there was no statistical significance for mortality ($P = 0.76$) and heart rate ($P = 0.46$). The LD50 for both salt types was found to be 1%. This study concluded that time in minutes, higher concentrations of MgCl₂, and higher concentrations of NaCl had increased mortality rates and decreased heart rates on daphnia, although no differences were found between the salt types.

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