

Effects on Steel Structure with the Increasing of Anti-Freezing Salt Spraying

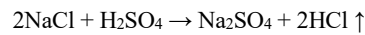
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Summary

Suspension of road heating system and intensification of anti-freezing salt spraying have been adopted as measures to save energy and reduce CO₂ emissions. Although anti-freezing salt spraying is important for traffic safety, it needs to be controlled to ensure environmental conservation and improve the service life of infrastructure. Therefore, we conducted a survey on snow-covered components in urban sites (Sapporo-predominantly anti-freezing salt spraying area), and rural and remote sites (predominantly sea salt area) to estimate the influence of anti-freezing salt spraying. Additionally, we also estimated the deposition of salt on chin-up bars in school playgrounds in Sapporo during winter.

Snow-cover samples and samples from chin-up bar were collected from 26 school playgrounds in Sapporo. As shown in Fig. 1-1, Cl⁻ concentrations were similar to survey results of 1980, before anti-freezing salt spraying was adopted (Suzuki, 1985). Additionally, a study of variation in Cl⁻ concentration with distance from the coast across Hokkaido and in Sapporo revealed that the effects of anti-freezing salt spraying were not distinguishable. In contrast, salt deposition on chin-up bars showed excessive Na⁺ compared to Cl⁻. This phenomenon can be explained by the release of HCl following a chemical reaction with H₂SO₄ derived from SO₂ during repetition of wet and dry conditions, and is described by the following equation.



Therefore, as shown in Fig. 2-1, the correlation between Na⁺ and Cl⁻+SO₄²⁻ was stronger than between Na⁺ and Cl⁻.

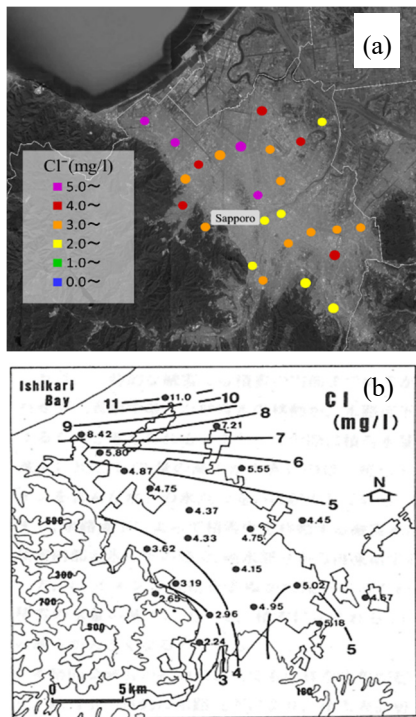


Fig.1-1. Concentration of Cl⁻ in snow-cover samples. (a) This results, (b) Suzuki, 1985.

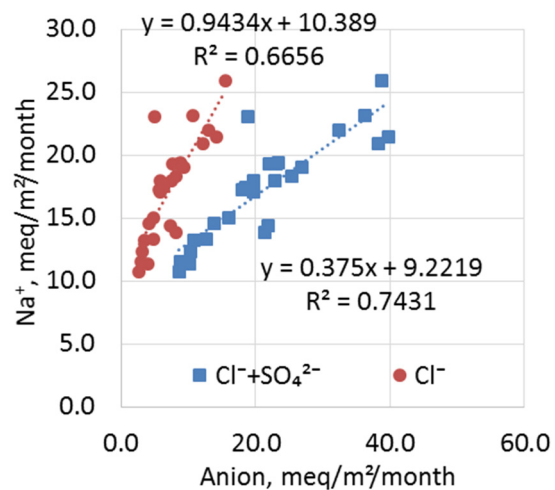


Fig.2-1. Deposition amounts of Na⁺ vs Cl⁻ and Cl⁻+SO₄²⁻. (Deposition amounts for bar, 28mmφ)