

# Reducing Sewer Corrosion Through Holistic Urban Water Management

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## Background

$\text{Al}(\text{SO}_4)_3 \cdot 14\text{H}_2\text{O}$  (Aluminum Sulfate) is the most commonly used coagulant in drinking water treatment plants worldwide. Under anaerobic conditions in the sewer system, the sulfate is biologically converted into sulfide gas and further to sulfuric acid.

## Results and Discussion

The source of over 50% of the sulfur in the sewer system is a result of using alum as a coagulant in water treatment. The sulfuric acid that is produced causes concrete sewer pipes to be corroded at the rate of several millimeters per year. As the cost of sewer systems maintenance is estimated at over \$10 trillion, which is 10-20% of the global GDP.

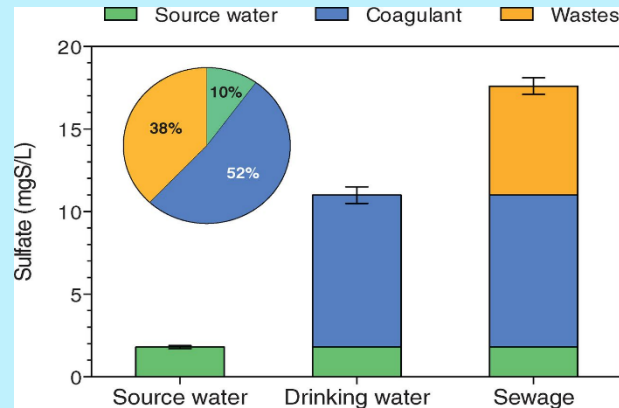


Figure 1: Sulfate concentrations in the sampled suburban area in 2009-2010.

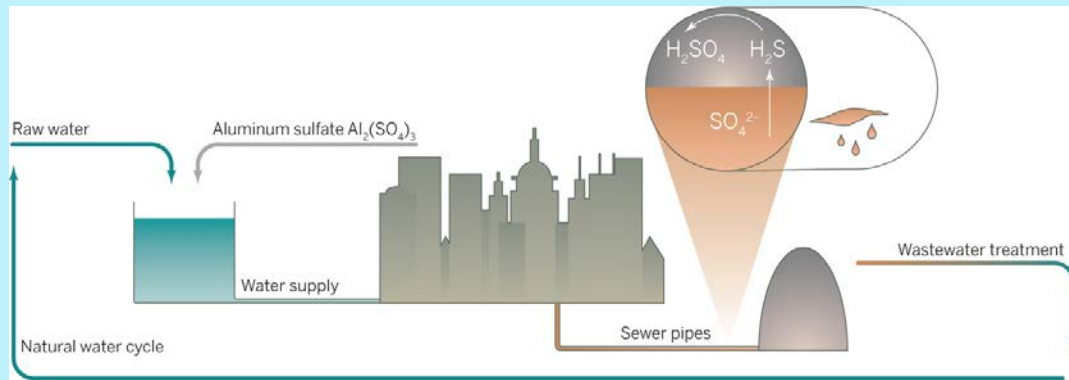


Figure 2: Transformation of sulfate in the water supply and sewer system.

## Objective

To evaluate the economical and environmental impact of aluminum sulfate coagulant on sewage distribution pipes.

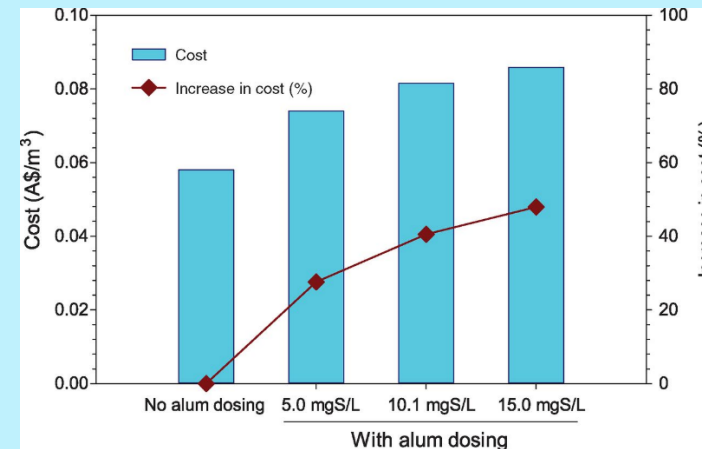


Figure 3: Predicted impact due to sulfate-based coagulants in drinking water treatment on sewer corrosion mitigation for average sewer and sewage conditions

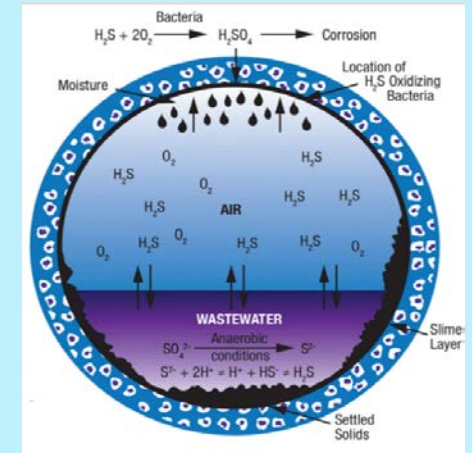


Figure 4: Biological transformation from sulfate ion to sulfuric acid

## Conclusion

Issues in water supply and sanitation are complex and interdependent. Holistic solutions need to take into account the effect they may have in both systems in order to reduce costs and increase efficiency.

[1] Rauch, W., & Kleidorfer, M. (2014, August 15). Replace contamination, not the pipes. *Science*, 345(6198), 734-735. doi:http://science.sciencemag.org/content/345/6198/734.full

[2] Pikaar, I., Sharma, K. R., Hu, S., Gernjak, W., Keller, J., & Z. (2014, August 15). Reducing sewer corrosion through integrated urban water management. *Science*, 345(6198), 812-814. doi:http://science.sciencemag.org/content/345/6198/812/iss=6198

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