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SUSTAINABLE ALKANOLAMINE-BASED METALWORKING FLUID: EVALUATION OF ANTIMICROBIAL ACTIVITY AND IMPACTS ON OCCUPATIONAL HEALTH

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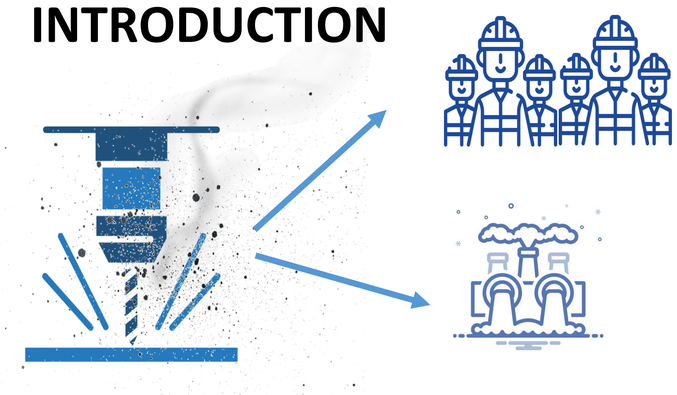
INTRODUCTION

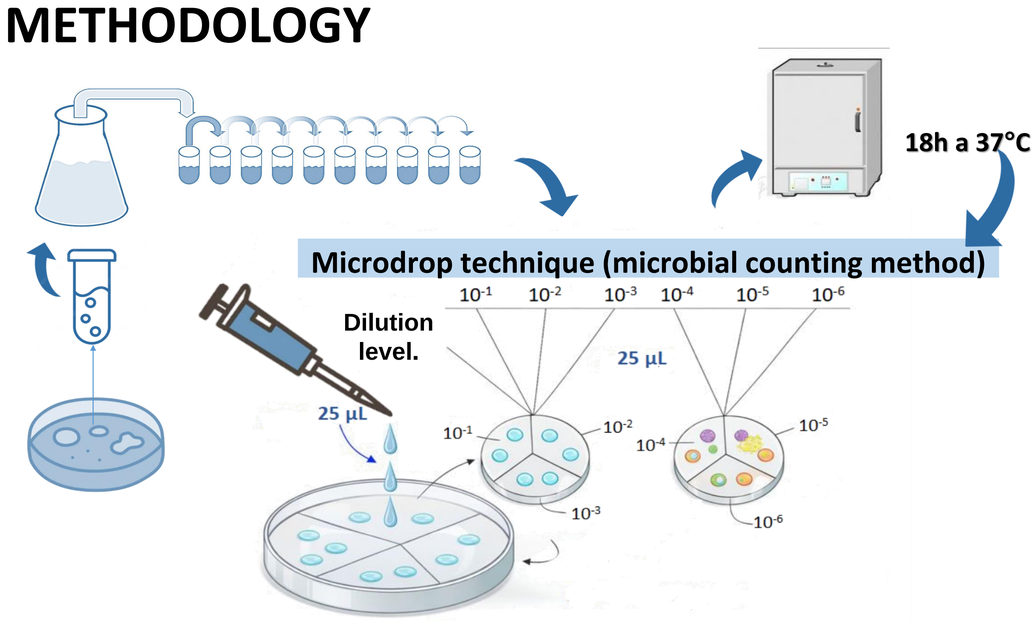


Microbiological contamination of metalworking fluids poses risks to occupational health and industrial product durability due to the growth of pathogens such as *Staphylococcus aureus*. Conventional control using biocides is effective but associated with toxicity and environmental concerns, highlighting the need for safer and more sustainable antimicrobial alternatives. [1,2].

OBJETIVES

This study aimed to evaluate the antimicrobial activity of a soluble metalworking fluid formulated with alkanolamines against *Staphylococcus aureus*, assessing its potential to reduce or replace conventional biocides.

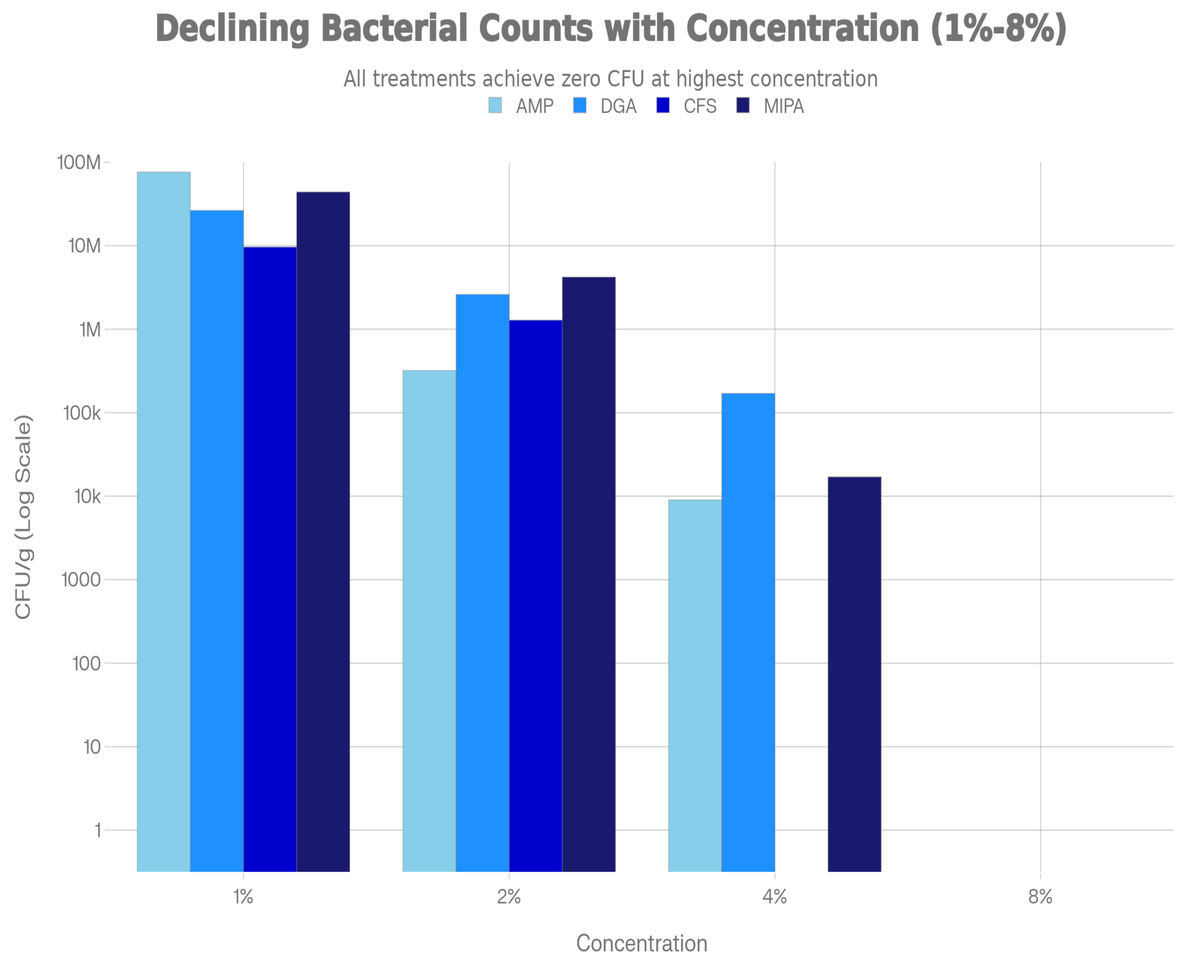
METHODOLOGY



The antimicrobial activity of a soluble metalworking fluid formulated with alkanolamines was evaluated against *Staphylococcus aureus*. Diluted fluid samples were incubated with standardized bacterial suspensions. The minimum inhibitory concentration (MIC) was determined using a resazurin-based colorimetric method, and colony-forming units (CFU/mL) were quantified using the microdrop technique on nutrient agar to assess bacterial growth inhibition.

Tested alkanolamines	
AMP	2-amino-2-metilpropan-1-ol
DGA	2-(2-aminoetoxi)etanol
CFS	Commercial alkanolamine mixture
MIPA	1-amino-2-propanol

RESULTS



GRAPH 1 – Determination of the Minimum Inhibitory Concentration (MIC) of Alkanolamines in the Metalworking Fluid

CONCLUSION

The concordance between the methodologies confirms the antimicrobial efficacy of the alkanolamine-based formulation. These findings highlight its potential as a sustainable metalworking fluid, offering reduced toxicity to operators, economic feasibility, and relevance for controlling biological risks while preserving occupational and environmental biosafety.

REFERENCES

1. OSAMA, M. et al. Recent developments and performance review of metal working fluids. Tribology International, v. 114, p. 389-401, 2017.
2. NETT, R. J. et al. Occupational respiratory and skin diseases among workers exposed to metalworking fluids. Current Opinion in Allergy and Clinical Immunology, v. 21, n. 2, p. 121-127, 2021.

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