

# THE FATE OF COPPER FOLLOWING COPTROL TREATMENT

## Literature Review

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Prepared for Aquatic Technologies

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# THE FATE OF COPPER FOLLOWING COPTROL TREATMENT

## OVERVIEW

- ✍ This literature review explores the fate of copper following an algaecide treatment with Coptrol
- ✍ Coptrol consists of copper in a non-ionic chelated form that is completely safe to use around aquatic organisms like fish and crustaceans, and for use in irrigation and drinking water, offering a safer and more effective alternative to traditional algaecides
- ✍ After treating algae, the copper from Coptrol is converted into stable less soluble forms which are inert and don't re-enter the water column
- ✍ Coptrol's ability to transform copper into safer forms makes it an environmentally friendly choice for managing algae in various aquatic ecosystems

## INTRODUCTION

Algal blooms pose significant challenges to aquatic ecosystems, impacting water quality and the health of aquatic life. Traditional copper sulfate has long been used to control algae, but it presents several environmental risks due to the presence of free copper ions, which are toxic to non-target organisms.<sup>1,2</sup> In contrast, Coptrol, a chelated copper-based algaecide, offers a safer alternative. Coptrol contains advanced forms of copper in a non-ionic, chelated form. This form is safer, making it a preferred option for water bodies intended for drinking, livestock, irrigation, etc.<sup>3</sup> and for water with aquatic life. Coptrol is also more effective in algal uptake, which ensures better control over algae growth compared to traditional copper algaecides.

## LONG-TERM FATE OF COPPER

After its application, Coptrol is rapidly absorbed by algal cells, disrupting their metabolism and leading to their eventual death<sup>2</sup> After being absorbed by the algae and having completed its job, the copper from Coptrol transitions into more stable forms, primarily as oxides or sulfides,

which are less soluble and remain largely inert in the aquatic environment.<sup>4</sup> These stable compounds are typically found at the bottom of water bodies, where they pose minimal ecological risk due to their low bioavailability.<sup>5</sup> This stability is key to why copper from Coptrol is safer than conventional algaecides following its usage.

The transformation processes are driven by local geochemical conditions, particularly the presence of sulfur and carbonate ions, which promote the formation of insoluble copper sulfides and carbonates.<sup>6</sup> These compounds, being chemically stable, do not easily re-enter the water column, thus ensuring that the copper remains in a safe form that does not harm aquatic life.<sup>4</sup> These copper compounds remain stable under typical water conditions in the absence of extreme pH and salinity. Treatments in extreme pH and salinity can be supplemented with the use of additional additives.

## ECOLOGICAL SAFETY OF COPTROL

One of the critical advantages of Coptrol is its low environmental impact following an application. The copper it introduces into water bodies is efficiently converted into stable, insoluble forms such as copper sulfides, which are biologically inactive.<sup>3</sup> Under typical environmental conditions, including neutral pH, neutral salinity, and anaerobic environments, these forms remain insoluble, preventing the re-release of free copper ions into the water.<sup>6</sup> The use of Coptrol thus ensures that copper does not accumulate in the water column or pose a risk to aquatic organisms or the broader ecosystem.

The end products of Coptrol's treatment action are chemically inert and do not contribute to the environmental burden, making it a safe and effective tool for managing algal blooms in various aquatic settings.<sup>5</sup>

Unlike traditional copper algaecides, copper from Coptrol is transformed into stable and safe forms, ensuring minimal long-term impact on aquatic ecosystems. This makes Coptrol a reliable and environmentally friendly option for controlling algae in water bodies used for drinking, irrigation, and supporting aquatic life.

## COPTROL

- ✍ Coptrol is a modern formulation of chelated copper using organic agents, making it structurally different from copper sulphate and other copper algaecides
- ✍ Unlike copper sulfate, Coptrol does not form precipitates in hard water or in water with dissolved organic matter, and is not neutralised by algae ensuring consistent effectiveness
- ✍ Coptrol contains less elemental copper than copper sulphate, and all copper is present in a non-ionic chelated form, making it safer for non-target organisms. It requires a smaller dose for effective algae control, making it suitable for use in water intended for drinking, livestock, or irrigation
- ✍ Coptrol targets algae more effectively by readily passing through algal cell walls and membranes ensuring efficient uptake and control
- ✍ Coptrol remains effective in water longer than other copper algaecides, which enhances its long-term efficacy compared to copper sulfate, allowing for lower doses to achieve similar results, thereby increasing cost-effectiveness
- ✍ After being absorbed by algae, copper from Coptrol is eventually transformed into insoluble compounds such as copper carbonate, which are harmless to aquatic organisms, humans, livestock, and crops, thus contributing to its reputation as an environmentally safe algaecide

After Coptrol effectively controls algae, the copper from Coptrol is converted into stable, safer forms which are inert and don't re-enter the water column, thus making it environmentally safer than other algaecides.

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