



COMPLIANCE SERVICES INTERNATIONAL

Lake Health, Copper and Your Health

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Science and Leadership: A Formula for Successful Lake Protection and Management

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Lake Health, Copper and Your Health

Copper 101 – for Fun!

Copper as a Curative

Copper and You



Copper 101

The most abundant ores containing copper are:

Malachite and azurite

And the largest deposits of these ores are found in:

Chile, Peru and the United States



Copper 101

The name for copper comes from: (a) a Greek goddess; (b) a Roman emperor; (c) a rock source

(c) A rock source, known as the “ore of Cyprus”

95% of the copper ever mined was extracted since (a) 1700; (b) 1800; (c) 1900

(c) 1900.



Copper 101

Man has been using copper since (a) 2000 BC;
(b) the Bronze Age; (c) before 7000 BC

(c) The earliest copper tool ever found dates from
8700 BC

The largest uses today of copper are in what industries? (a)
automobile; (b) pesticide; (c) energy; (d) communications

(c) and (d) Energy and communications



Copper 101

It is estimated that what percent of copper ever mined is still in use today? (a) 10%; (b) 20%; (c) nearly all of it

(c) Approximately 80% of the copper ever mined is in use today. Copper is 100% recyclable.

Scientists believe that at the rate we are extracting copper from the earth's crust it will be gone in 500 years. (a) True (b) False

(b) False. At current mining rates, copper can be extracted for another 5 million years



Copper 101

A certain level of copper is good for you. (a) Yes
(b) No

(a) Yes. Copper is an essential nutrient needed for certain metabolic processes

Copper is found in (a) food; (b) natural waters;
(c) air.

All three



Copper 101

Copper pest control products can be used in certified organic agriculture. (a) Yes (b) No

(a) Yes. Copper sulfate and fixed copper products having a tolerance exemption are allowed in nearly all crops

Copper sulfate can be used for algae control in certified organic rice culture. (a) Yes (b) No

(a) Yes. Treatment rates are similar to copper used in lake algae control



Copper 101

Copper does not have medical uses in: (a) Organic livestock production; (b) human drugs; (c) food coloring

(c) Food coloring

Copper can be found in the Earth's crust at levels as high as (a) 5 ppm; (b) 50 ppm; (c) 500 ppm

(c) 500 ppm



Copper 101

Maximum use rates of copper in algae control are limited by: (a) standards set based on human toxicity; (b) solubility; (c) levels that affect non-target aquatic organisms

(c) Levels that affect non-target organisms

Copper, when used as a pesticide, is exempt from the requirement for a residue tolerance. (a) True; (b) False

(a) True. However, there is a drinking water standard for copper of 1.3 ppm



Now Let's Apply What We Just Learned: Copper and Health

- Copper is essential for the homeostasis of life
- “Homeostasis” is your body’s ability to regulate processes and conditions, for example



Your body temperature



Now Let's Apply What We Just Learned: Copper and Health (2)

- There is a daily recommended level for copper as a nutrient



**Adults: Minimum of 1.3 mg
per day**

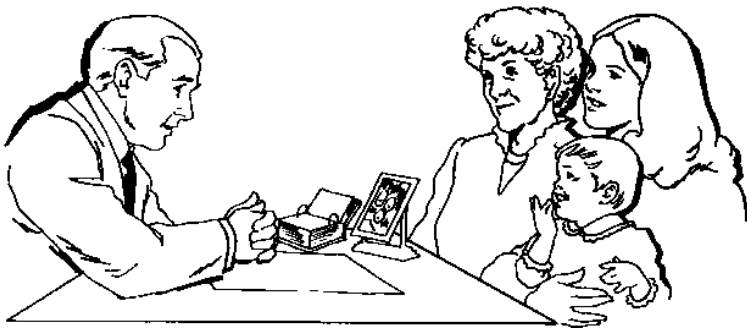


**Children: Minimum of 0.34 mg
per day**



Now Let's Apply What We Just Learned: Copper and Health (3)

- Because copper is so ubiquitous, the average daily consumption actually is typically 1 to 5 mg/day
- In fact, EPA's Office of Pesticide Fact Sheet on Copper Pesticides notes:



Generally, current available data and literature studies indicate that there is a greater risk from the deficiency of copper intake than from excess intake. A deficiency of copper or a defect in copper carrying proteins may result in symptoms such as anemia, defective blood vessel development, or connective tissue symptoms.



Copper Mythology

- In ancient Rome, Copper was associated with the goddess Aphrodite and in alchemy, with Venus. Why?



This is most likely because it was the only material then that could be used to make mirrors



Copper Mythology

- Copper bracelets relieve arthritis pain



Repeated studies have shown that such devices have no advantage over placebo wrist straps, and that any perceived benefit is from psychological placebo effects



Copper Mythology

- Copper can steer spiritual energy back and forth between individuals

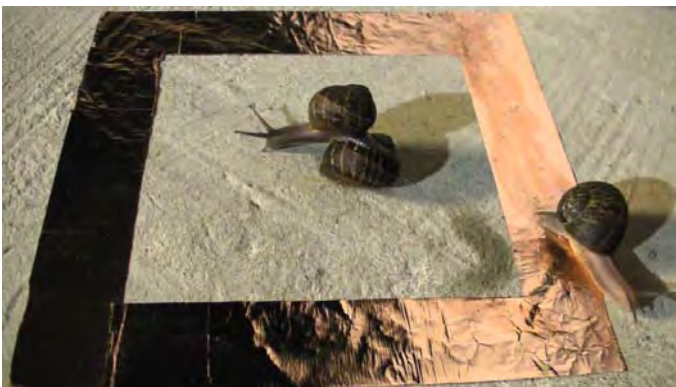


This belief is largely associated with copper's ability to conduct electricity, and in early times, transfer static electricity in the form of a mild shock



Copper Mythology

- Copper pennies, wire, foil or tape will repel slugs and snails



This is a garden myth. While the smooth surface may afford poor traction, it doesn't stop a hungry snail. For a fun video of how this *doesn't work*, see <http://www.gardenmyths.com/how-to-get-rid-slugs-with-copper/>



But Copper Does Control Algae

- Copper sulfate is used for algae control at rates of 0.6 to 5.5 ppm
- Rates vary based on the alkalinity of the water treated
- In most copper formulations, a rate of 1 ppm (1 mg/L) is equivalent to 0.26 mg/L copper

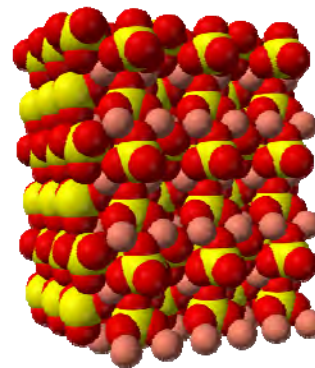
For the most part, copper (the metal ionic form) acts as the “active ingredient”



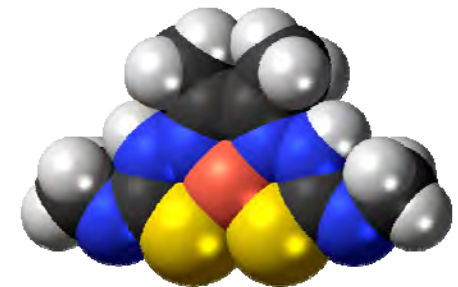
But Copper Does Control Algae

- Chelated copper is also used for algae control
- Rates vary based on type and density of algae treated
- A rate of 0.6 to 1 ppm (1 mg/L) copper may be used

Again, copper (the metal ionic form) acts primarily as the “active ingredient”



Copper Sulfate



Chelated Copper



Rate Calculation

- Is usually calculated base on the top 2 feet (or some portion) of the water column, not the whole water body
- Let's assume that is about 1/3 of the total water area (in reality it is probably much less)



} Treatment Area



Exposure Calculation

- 4 liters of drinking water extracted from the lake and consumed immediately after treatment would deliver the minimum daily requirement of copper
- It would take the consumption of 300 liters of water in a day to deliver a copper dose that approaches toxicity to humans



Yes, “Water Toxicity” is Possible

- Consumption of more than 5 liters of drinking water at one time can be overwhelming to the body and potentially fatal



Approximately
15 people
die each year from
water intoxication
(drinking too much water)



Is Use of Copper for Algae Control a Health Hazard

Registered copper products can be used with a wide margin of safety and are not a health hazard to lake users



Thank you for this opportunity to share my
thoughts and opinions

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