



WMC PUBLIC HEALTH BENEFITS OF COPPER

WOMEN'S MINING COALITION

Policies Needed to Produce More Domestic Copper, Reduce Copper Imports and Promote Broader Use of Copper in Hospitals and Public Places

Copper has proven antimicrobial and anti-viral properties that could play an important role in fighting the COVID-19 virus and in minimizing the spread of other viruses and bacteria that could cause future pandemics.

To capitalize upon and expand the public health benefits of copper, Congress should enact policies that:

- Support and provide appropriate funding to increase the use of copper as new or replacement surfaces in the Nation's hospitals and public places;
- Promote responsible development of U.S. copper resources;
- Ensure public lands with known copper deposits remain available for mineral exploration and development;
- Reduce our reliance on copper from non-allied foreign countries; and
- Expand our domestic copper processing capabilities to eliminate our dependence on smelters in China and other countries.

ANTIMICROBIAL COPPER FACTS

- Copper alloys can be used on surfaces to reduce the resident time of microbes.
- Use of copper surfaces can supplement standard infection control practices.

Factors that make antimicrobial copper the most effective touch surface microbe control material:



Graphic: Copper Development Association

- By 2011 the EPA had approved 355 copper alloys that contain at least 65% copper as solid surface materials for use against six types of disease-causing bacteria.
- In total, 282 copper alloys with copper contents greater than 60% are registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and are allowed to carry the name "Antimicrobial Copper."
<https://www.epa.gov/enforcement/federal-insecticide-fungicide-and-rodenticide-act-fifra-and-federal-facilities>

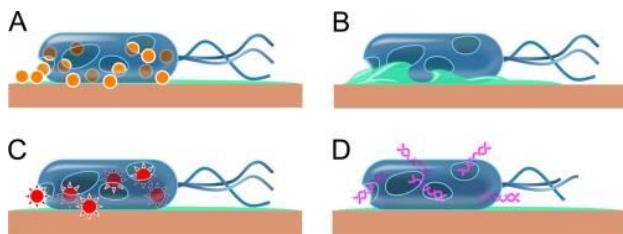
Copper's antimicrobial properties are not a new discovery. Brass containers are used to store water to inhibit bacterial growth. Copper sulfate and other copper compounds are most commonly used in agriculture to treat plant diseases, like mildew, for water treatment, and as preservatives for wood, leather, and fabrics.

<https://www.atsdr.cdc.gov/phs/phs.asp?id=204&tid=37>

Copper's anti-microbial properties **kill bacteria, viruses and yeasts** on contact, according to a 2011 paper in the journal *Applied and Environmental Microbiology*. As a result, copper can be woven into fabrics to make anti-microbial garments, like **socks that fight foot fungus**. <https://www.livescience.com/29377-copper.html>

HOW CONTACT WITH COPPER KILLS MICROBES

- Copper dissolves from the copper surface and causes damage to the cell of the microbe.
- The cell membrane ruptures because of copper and other stress phenomena, leading to loss of membrane potential and cytoplasmic content.
- Copper ions induce the generation of reactive oxygen species, which cause further cell damage.
- Genomic and plasmid DNA becomes degraded.



Graphic: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3067274/>; *Appl Environ Microbiol*. 2011 Mar; 77(5): 1541–1547.
Published online 2010 Dec 30. doi: [10.1128/AEM.02766-10](https://doi.org/10.1128/AEM.02766-10)

ANTIVIRAL STUDIES

The virus that causes coronavirus disease 2019 (COVID-19) is stable for several hours to days in aerosols and on surfaces, according to a new study from the National Institutes of Health, CDC, UCLA, and Princeton University published on March 17, 2020 in the *New England Journal of Medicine*. (DOI: [10.1056/NEJMc2004973](https://doi.org/10.1056/NEJMc2004973))
<https://www.nejm.org/doi/full/10.1056/NEJMc2004973>

Scientists found that severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was detectable in aerosols for up to three hours, up to

four hours on copper, up to 24 hours on cardboard and up to two to three days on plastic and stainless steel. Researchers at the University of Arizona are investigating whether copper's toxicity to certain pathogens can be harnessed to kill the COVID-19 virus. <https://research.arizona.edu/stories/could-copper-disable-virus-behind-covid-19>

USING COPPER TO PREVENT THE SPREAD OF RESPIRATORY VIRUSES

Date: November 10, 2015

Source: University of Southampton

Recent research shows that copper can effectively help prevent the spread of respiratory viruses, which are linked to severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). Animal coronaviruses that 'host jump' to humans, such as SARS and MERS, result in severe infections with high mortality. Researchers found that a closely related human coronavirus, 229E, can remain infectious on common surface materials for several days, but is rapidly destroyed on copper.

In an earlier study, influenza A virus was brought into contact with a copper-plated surface and the number of infections was counted across time. About 75% of the virus was killed in one hour, and the count was reduced to 0.025% in six hours. Recent studies show that copper is effective in deactivating norovirus (tested using feline calicivirus, a surrogate for norovirus).

<http://www.jcda.or.jp/english/tabid/146/Default.aspx>

CURRENT MAJOR USES OF COPPER: THE WORLD COPPER FACTBOOK 2019

- Copper and brass are the materials of choice for plumbing, taps, valves and fittings. Thanks in part to its aesthetic appeal, copper and its alloys, such as architectural bronze, are used in a variety of settings to build facades, canopies, doors and window frames.
- Unlike plastic tubing, copper does not burn, melt or release noxious or toxic fumes in the event of a fire. Copper tubes also help protect water systems from potentially lethal bacteria such as legionella. Copper fire sprinkler systems are a valuable safety feature in buildings.

- The use of copper doorknobs and plates exploits copper's biostatic properties that help prevent the transfer of disease and microbes.
- Copper roofing, in addition to being attractive, is well known for its resistance to extreme weather conditions. Major public buildings, commercial buildings and homes use copper for their rainwater management and roofing needs. The telltale green patina finish, that gives copper the classic look of warmth and richness, is the result of natural weathering.
- Copper is being used for antimicrobial touch surfaces in many hospital settings and in consumer products such as handles, doorknobs, and fitness equipment. It is also being used for lead-free brass plumbing, high-tech copper wiring, and heat exchangers.
- Copper is used in batteries, windings and copper rotors in electric motors, and electrical vehicle charging stations. It is an essential component of electric vehicles, which use four times the amount of copper compared to conventional vehicles. <https://www.icsg.org/index.php/component/jdownloads/finish/170-publications-press-releases/2965-2019-10-29-icsg-factbook-2019?Itemid=0>

MORE MINING OF U.S. COPPER RESOURCES WOULD REDUCE OUR RELIANCE ON CHINA

Congress Must Not Enact Policies that Put Lands Off-Limits to Mining

According to the USGS' *2020 Mineral Commodity Summaries*, Arizona is the largest copper-producing state followed by Utah, New Mexico, Nevada, Montana, Michigan, and Missouri. Several mining companies are exploring and seeking to develop Minnesota's world-class copper deposits.

Despite our abundant domestic copper resources, in 2019, the U.S. imported 35 percent of the copper we used, and relied on China and other countries to smelt and refine much of the copper that we do mine. As the COVID-19 crisis clearly illustrates, relying on China for critical supply-chain materials like refined copper poses a serious threat. According to the International Copper Study Group, China accounted for over 40% of world copper smelter production in 2018. There are only three copper smelters in the U.S. – one in Utah and two in Arizona.

Current bills including H.R. 2579 (Grijalva), S. 1386 (Udall/Heinrich), and H.R. 5598 (McCollum) would put important copper resources and other minerals off-limits to development. These ill-considered policies would increase the country's reliance on China and other non-allied countries for the copper and other minerals that are essential to America's economy, technology, infrastructure, and defense.

In its March 28, 2020 *Guidance on the Essential Critical Infrastructure Workforce*, the Department of Homeland Security, Cybersecurity and Infrastructure Security Agency recently classified the mining sector as part of the critical manufacturing infrastructure workforce necessary for the country's response to the coronavirus. The guidance document states "workers necessary for mining and production of critical minerals, materials and associated essential supply chains" are part of the critical workforce that should maintain their work schedules to aid in the United States' response to the coronavirus outbreak.

About WMC

WMC is a grassroots organization with over 200 members nationwide. Our members work in all sectors of the mining industry including hardrock and industrial minerals, coal, energy generation, manufacturing, transportation, and service industries. We hold annual Washington, D.C. Fly-Ins to meet with members of Congress and their staff, and federal land management and regulatory agencies to discuss issues of importance to both the hardrock and coal mining sectors. For more information about WMC, please visit our website at:

www.wmc-usa.org



COPPER AS AN ANTIMICROBIAL

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COPPER

Continuously Kills Bacteria
Never Wears Out
Safe To Use

By 2011 the EPA had approved 355 copper alloys, containing at least 65% copper as solid surface material for use against six types of disease causing bacteria.



Alloys

282 Copper Alloys have been registered under the Federal insecticide, Fungicide and Rodenticide Act (FIFRA).

Prevention

Its biostatic properties help prevent the transfer of disease and microbes.

Resistance

It does not burn, melt or release noxious or toxic fumes.

Clothing

It can be woven into fabric to make anti-microbial garments, like socks to prevent foot fungus.



Viruses

It can prevent the spread of respiratory viruses by degrading genomic and plasmid DNA.

THE MANY USES OF COPPER

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Copper application areas cover a wide variety of different disciplines. Here are just a few examples.



1

Architecture

Copper and its commonly used family of alloys of brass and bronze have been utilized for hundreds of years in architecture, both interior and exterior.



2

Automotive

Copper is an essential component of many of the latest design elements in today's cars, including electric vehicles.



3

Electrical

Copper's high conductivity makes it the ideal material in a wide variety of electrical applications including, electrical energy efficiency, power quality and building wire.



4

Tube & Piping

Copper tube is the highest quality material available today for a variety of building applications including plumbing, fire sprinklers and more.



5

Fuel Gas

Copper tube is an excellent choice for natural gas piping systems.

6

Industrial

Copper serves as an essential material in a vast number of industries including electronics.



7

Marine

Copper's unique properties make it ideal for many applications in the harsh environments of marine due to its corrosion behavior, galvanic behavior, marine biofouling, recyclability and good practices.



8

Machined Products

Copper alloy rod and bar products are well suited for versatile bearings and forgings.



9

Telecommunications

Communications are the backbone of today's fast-paced businesses, and copper wiring is at the core of those systems.

