TREATED WOOD
TOPIC FACT SHEET

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What is treated wood?

Wood used for construction, telephone poles, railroad ties, and garden beds may be treated with pesticides to prevent rotting. **Wood treatments** are not meant to be water resistant. These products are used to extend the life of wood by limiting damage from insects and mold. Treating wood also reduces the waste of forest resources by delaying the need for replacement due to decay.

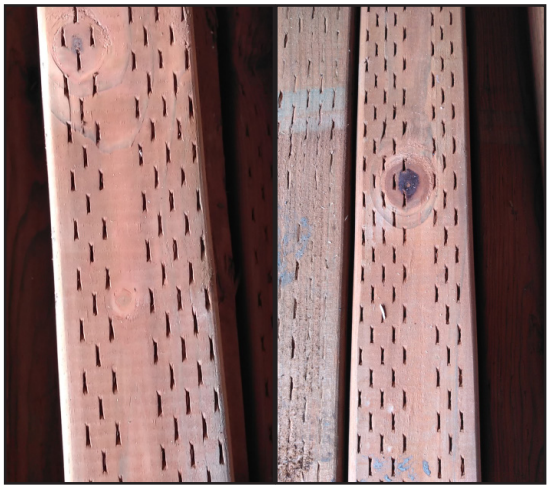
Photo credit: National Pesticide Information Center

What are the different types of treated wood?

The two main groups of treated wood are water-based and oil-based. Water-based preservatives are applied to wood with a water solution. Oil-based products are applied to wood in an oil-based solution. Surfaces of oil-based treated wood may not be paintable and odors may be stronger.[1]

Manufacturing methods for treated wood include pressure treatment, dipping, or soaking. Some paint-on products are also available.[2] Each type of wood preservative has a different mixture of ingredients. Only a few wood preservatives are discussed in this fact sheet. For more information, visit our webpage about the different types of wood preservatives.

Water-Based Preservatives

Alkaline Copper Quaternary (ACQ) preservatives have copper and another compound to protect wood from decay.[3]

Copper Azole (CA) preservatives have copper and a fungicide. Copper is the main ingredient. Some types also contain boric acid.[3]

Chromated Copper Arsenate (CCA) was removed from most residential uses in 2004. It is still used in industrial applications such as poles, foundations, support columns, and pilings.[4]

Micronized Copper Azole (MCA) and **Micronized Copper Quaternary** (MCQ) have small copper particles and another compound to protect wood from decay. The particles of copper are so small they fit into the small holes in the structure of the wood. Copper particles are lodged in the wood rather than chemically bound.[4] Micronized copper uses less copper than similar preservatives.[5]

Oil-Based Preservatives

Copper Naphthenate is used in both oil- and water-soluble formulations.[2] The oil type has been used since the 1940's.[3]

Creosote is used in commercial projects. Creosote treated wood is not available for use at home (indoors or outdoors). Re-use of treated wood is not regulated by the EPA. Creosote is made from coal tar and is commonly used in railroad ties and utility poles.[6]

Pentachlorophenol is used in commercial projects. It is not registered for at-home use, but it may have been used residentially in older homes. It is commonly used to treat railroad ties, utility poles, and pilings.[7]

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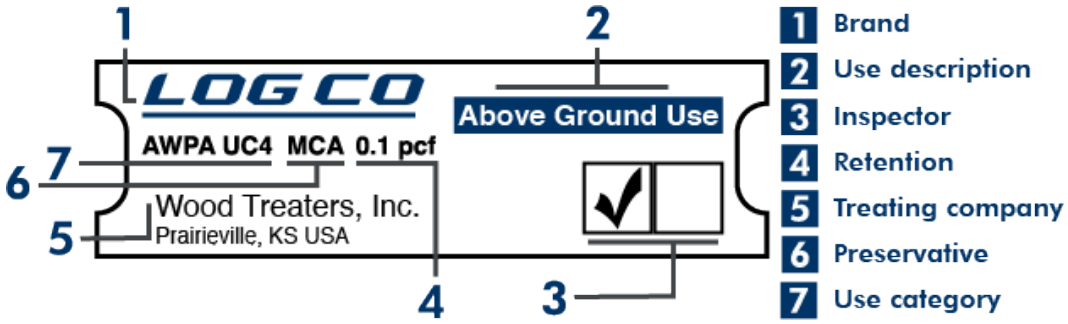
How do I know which type I have?

Treated wood should have an end tag attached to the end of the board. End tags may look similar to **Figure 1**. Proper use sites are written on the tag as a "Use Category." It will also state if the wood is intended for use indoors or outdoors, and for water, ground, or above ground contact. The end tag will also list the type of preservative used on the wood. Using the proper treated wood in the right situation will help to limit the risks of exposure to the pesticide.

FIGURE 1. EXAMPLE OF A TREATED WOOD END TAG



Can some people react to wood preservatives?

When exposed to any pesticide, people may react in different ways. Some may be more sensitive than others. If someone were to touch the treated wood or inhale dust from the wood, there may be different levels of risk or toxicity. The risks may increase if the wood is cut or burned.

The risk from any pesticide depends on both the toxicity of the product and exposure. **Tables 1 and 2** can be used to compare the toxicity levels of some **wood preservatives**.

Table 1. Short-term Toxicity of Components in Water-based Preservatives

Component	Preservative Type	Oral	Dermal	Inhalation	Eye Irritation	Skin Irritation
Arsenic[8]	CCA	Low	Very low	Low	Low	Very low
***Chromium (VI)**[8]	CCA	High	Moderate	Moderate	High	High
****Copper**[9]	CCA, CA, ACQ, MCA, MCQ	Moderate to Very low			Some forms are eye irritants	Low to Very low

* Chromium(VI) Is not likely to be on surfaces of treated wood.[8] While treated wood dries, most chromium(VI) changes to another form, chromium(III).[10]

** Forms of copper may vary in toxicity. Toxicity studies with micronized forms of copper are available.[11] ACQ, CA, MCA, and MCQ contain copper but also other ingredients not discussed in this fact sheet.

Table 2. Short-term Toxicity of Oil-based Preservatives

Preservative	Oral	Dermal	Inhalation	Eye Irritation	Skin Irritation
Copper Naphthenate[12,13]	Low	Low	Low	Low	Moderate
Creosote[14]	Low	Low	Very low	Low-Moderate	Low
Pentachlorophenol[15]	Moderate	Very low	No Acceptable Data	Moderate	Low

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Where can I find guidance on choosing treated wood?

Treated wood selection may depend on use location, cost, and other factors. The **American Wood Protection Association** (AWPA) sets voluntary standards for how to reduce wood decay through different treatments. These standards are based on wood durability, not health risk. Local building codes may specify the AWPA category or type of treated wood for a project. An Evaluation Report from the International Code Council-Evaluation Service (ICC-ES) may confirm that a certain type of treated wood complies with building codes.[2]

- Consider contacting your local **County Extension Service** or **Master Gardeners** for possible guidance with wood selection.
- Most treated wood is not for indoor use. Incorrect use could pose health risks.
- An **infographic guide** from AWPA can help to determine which type of treatment may be right for a project. Home use may include a fence, deck, or garden bed.
- Call the **National Pesticide Information Center** to compare risks between treated wood types, 8:00am – 12:00pm PT Monday through Friday, or email at npic@ace.orst.edu.

What precautions can I take when using treated wood?

Risks related to treated wood depend on the use site and type of treated wood. Using the correct type of treated wood for your project may help keep the risks low. Whether wood is used in a garden bed or another structure, keep these tips in mind:

Image credit: pixnio.com

- There may be substitutes if you choose to avoid treated wood. Consider untreated hardwoods, concrete, or plastics.
- Treated wood may be covered with heavy plastic or coated to limit leaching. It may take multiple coats of a sealant.[16]
- Small amounts of treated wood ingredients in play structures, decks, or picnic tables may transfer to skin or clothing from contact. Less copper came off on wipes after copper azole (CA) and micronized copper azole (MCA) treated boards were weathered for about a year.[17] Consider using a tablecloth on picnic tables made from treated wood to reduce skin and food contact.
- Re-use of treated wood is not regulated by the EPA. Therefore, the risks of using recycled wood have not been evaluated by the agency.
- Adults and children may consider washing hands after touching treated wood before eating, drinking, or using the restroom.
- Do not burn treated wood and do not use ash or compost from treated wood in edible gardening.

Precautionary steps while working with treated wood:

- If cutting or sanding treated wood, use a dust mask to limit the chance of inhaling the treated sawdust. Consider wearing goggles and gloves to reduce exposure to eyes and skin.
- Dusts can build up in closed spaces. Work outdoors or in a ventilated space.
- If preservatives or sawdust have contaminated clothes, launder prior to wearing them again. Wash them separately from other clothes.
- Collect and dispose of sawdust from treated wood. Avoid contamination of nearby soils and water.

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Can treated wood be used in garden beds?

Certain types of treated wood may be used in backyard projects. Compounds like chromated copper arsenate (CCA), creosote, and pentachlorophenol are not registered to treat wood for consumers, including use in garden beds.[14,15,18] The risks of using recycled wood treated with CCA, creosote, and pentachlorophenol have not been evaluated by the EPA. However, it is expected that the amount of leaching from used wood is less than from freshly treated wood.[8,14,15]


Photo credit: walkersalmanac via Pixabay

Can plants take up ingredients from treated wood?

If compounds leach from treated wood, they may be available for uptake by garden plants. However, it is difficult to predict the amount of plant uptake. Materials used in treated wood that leach into soil may be **bound to soil**. They also may change into different forms that plants cannot take in through their roots. Information about plant uptake is limited.

Plant uptake may depend on many factors, including plant type, soil type, and distance to the treated wood. For some components of treated wood, levels may be higher in the roots and fibrous plant parts.[19] Other studies suggest accumulation in the leaves.[20] The amount of root uptake can also vary by plant or crop, even when grown in the same soil.[16]

Here are a few considerations for treated wood use in a garden bed:

- Generally, preservatives tend to move less in organic-rich soils.[21] In one study, adding compost to soil reduced the amount of arsenic taken up by carrot and lettuce plants.[22]
- Consider planting edible crops away from the edges of garden beds. Soils next to treated wood are likely to have more chemicals from the wood.
- Peel root vegetables and **wash** soil from foods grown in a garden bed with treated wood. Soil can have higher levels of preservatives than the foods themselves.[23]
- The amount of uptake of compounds from treated wood by plants is highly variable.

Can preservatives leach into groundwater or soils?

Many factors can affect whether a preservative can leach out of treated wood. Studies show that leaching can be highly variable. The type of preservative or wood and the manufacturing process can affect leachability.[4] Moisture, soil type, soil contact, and soil acidity can also affect leaching.[4,12,24,25,26] Metals from CCA, ACQ, and CA were least mobile in organic (compost-rich) soils.[27] Most leaching occurs in the first few months of use.[4,8,21,28]

Once an ingredient leaches from treated wood, it may stick or **bind to soil**, making it less mobile. The distance a preservative may move could depend on the soil, age of wood, and type of preservative. Metals introduced into soil do not readily move downward following leaching, as most bind to soil. Introduction into groundwater may be limited.[15,26]

Water-Based Preservatives

Micronized Copper preservatives tend to leach less copper than other copper based wood preservatives.[4,5]

Alkaline Copper Quaternary (ACQ) and **Copper Azole** (CA) generally leach more than CCA-treated wood. However, the parts that are released into the environment tend to be lower in toxicity.[4] Leaching of ACQ was studied in a wetland boardwalk. After one year, copper levels were elevated up to two feet from the boardwalk.[29]

Chromated Copper Arsenate (CCA) can leach copper, chromium, and arsenic. Copper may leach the most readily. Chromium may be the least likely to leach.[8] Other studies have shown that arsenic may leach more readily.[21,30] Copper and chromium tend to stick better to soils than arsenic, which tends to be more mobile.[4,21,26] CCA movement in soils can range from less than 6 inches to up to 8 feet from a structure.[29,31,32]

Oil-Based Preservatives

Copper Naphthenate is not highly soluble in water and is only slightly mobile in soil.[4,12,21] It may leach more in acidic soil than in neutral soil. It is not expected to volatilize from the wood.[12]

Creosote has some compounds that leach from the wood. Some components of creosote may also volatilize from treated wood.[14]

Pentachlorophenol is slightly mobile in soil.[15] It tends to leach more readily in less acidic soils.[25] Besides leaching, it may also volatilize from treated wood.[15]

How do I dispose of treated wood?

Rules about the disposal of treated wood may differ in each state. Treated wood that has not been fully weathered (new boards or poles) may be considered hazardous waste. If treated wood is not considered to be hazardous waste, it may be disposed of at a landfill or through municipal trash collection. Contact a **hazardous waste program** in your state for specific regulations about treated wood.

Do not burn treated wood. Chemicals in treated wood may become more harmful if they are burned and inhaled. Treated wood should never be used as compost or as mulch.

Can certified organic farms use treated wood?

Only specific pesticides defined by the U.S. Department of Agriculture (USDA) may be used to produce organic foods. Lumber that contacts food, animals, or soil may only be treated with substances on the National List of Allowed and Prohibited Substances. Certain ingredients, such as **arsenic**, are not allowed for use in organic systems. Different rules may apply if treated wood will not contact soil, animals, or food. Consider contacting a certifying agent for details on how to comply.

Where can I find more information?

For more detailed information about treated wood please visit the list of referenced resources below, call the National Pesticide Information Center, Monday - Friday, between 8:00am - 12:00pm Pacific Time (11:00am - 3:00pm Eastern Time) at 800-858-7378, or visit us on the web at npic.orst.edu. NPIC provides objective, science-based answers to questions about pesticides.

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