G7FSRWO

Is It Red Oak or White Oak?

Color Test Will Tell

If you're in a business where separating red and white oak logs, lumber, or veneer is necessary, this test is for you. It is a quick yet accurate color test using a 10 percent solution of sodium nitrite ($NaNO_2$) that is either brushed or sprayed on the heartwood.

How Does It Work?*

The sodium nitrite makes the natural light brown color of red oak hardwood only slightly darker, but it turns white oak heartwood yellow-orange, then red-brown, and then dark green or purple to black.

Colors on both red and white oaks fade in several hours, turning greenish brown so that no distinction between the two can be made. The specific color reaction occurs on heartwood only. Sapwood and wood heavily colored by fungi do not give a suitable reaction.

How Is It Applied?

Sodium nitrite is available from chemical supply stores. Use 3.34 ounces per quart (104 g per L) of either tap or distilled water to get the 10 percent solution.

The solution remains effective for several months. Warm weather does not alter the effectiveness. In cold weather with temperatures below 27°F (- 2.5°C), 20 percent ethylene glycol can be added to the solution as an antifreeze agent.

**Research conducted by the U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, WI, in cooperation with the Federal Research Organization for Forestry and Forest Products, Institute of Wood Biology and Wood Preservation, Hamburg, Federal Republic of Germany. This brochure is a condensed version of "Identifying white oak logs with sodium nitrate," by Regis Miller et al., Forest Products Journal 35(2):33-38.*

The solution should be applied with a brush or a spray bottle to an area at least 2 inches (5 cm) in diameter. When spraying the solution, wear goggles and a mask to avoid getting it in your eyes or inhaling it. Eye droppers or glass rods are best for lab tests or when accuracy of application is necessary.

The color change shows up best on green wood but works equally well on dried wood. **The solution does not work on surfaces drenched in water or covered with hoar frost. For weathered logs with gray ends or those ends coated with wax, a fresh surface of wood must be exposed.** This can be done with a chisel.

What Else Do I Need To Know?

Moisture Content

The test works on wood with moisture contents from green to 6 percent. In green or fresh material, the reaction time is faster, the yellow, orange, and red shades seem more brilliant, and the color sequence is more distinct. However, the determining color (white oak = dark green or purple to black, red oak = brown), is always the same.

Concentrations

No differences in effectiveness are detected between 5, 10, and 20 percent solutions of sodium nitrite. At the 1 percent level, the reaction occurs, but the color series is less intense, and the reaction time is longer. The 10 percent solution is recommended to ensure sufficient chemical when used on green and wet logs.

Specimen Size

Large and small pieces of oak react in essentially the same time and produce the same color sequence. In wood flour, however, the reaction time is slightly faster, and the final color of the red oak is greenish brown.

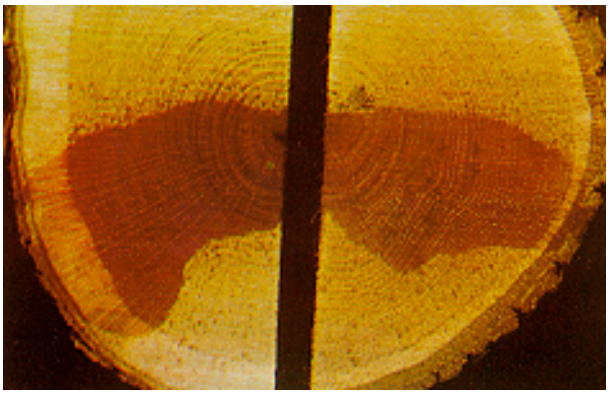
Temperature

At 80°F (27°C) the reaction takes about 5 minutes, but as the temperature is lowered, the reaction takes longer. At 50°F (10°C) the rate is about 20 minutes, at 32°F (0°C) 60 minutes. Below freezing, the rates are much longer, almost 24 hours at -4°F (-20°C). These rates, however, are based on using a cold solution and attaining a completed reaction.

In cold and freezing weather, the solution can be heated to 194°F (90°C). When a heated solution is used on cold or even frozen samples, the rate of reaction increases. The rate also increases if the surface of the sample is heated, which can be done with a hair dryer, hot iron, or blow torch. If both solution and surface are heated, the reaction rate greatly increases.

Other Species

Only species of chestnut *(Castanea)* in the oak family *(Fagaceae)* react like white oak. Species of chinkapin *(Castanopsis),* which are also in the oak family, occasionally react like white oak. Other eastern U.S. hardwoods react like red oak.



Color reaction on white oak (left) and red oak (right) just after spraying (top), 5 minutes after spraying (middle), and 2 hours after spraying (bottom). Room temperature.

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