

Processing Wood – Breathing the Air in a Woodshop (2 of 4)

Avoid Creating a Potential Hazard -- Sawdust

Info in red font is for the benefit of the teacher (notes and ideas for differentiated learning etc). Delete text in red font from the copies that are distributed to students.

In a document / template that is intended to be "filled in" by students for assessment / evaluation purposes, the Version History table can be retained for students to use. Making an improved version is great learning.

Version History:

V #	Date	Author	Short Listing / Description of Changes
1	July 16/12	D.B. McCowan	Initial Version -- uploaded to OCTE Safety Portal
2			

Parts

- 1 Expectations; Introduction; Review; Sample Situation; Hardwood vs Softwood
- 2 **Thinking -- Finding Information: Properties of Wood Species**
- 3 Observation and Research: Processing Wood Using Tools; Sanding and Limitations
- 4 Integrate New Knowledge With Old; Assignment for Marks

1 Thinking – Finding Information – Properties of Wood Species

On the internet find some web pages about the properties of various woods, for example some of those in the table below. (You may also go to the library!)

www.wood-database.com – The Wood Database

www.swst.org – Society of Wood Science and Technology

www.fpl.fs.fed.us -- Forest Products Laboratory

From your on-line and library sources, finish filling in the following table as given to you by the teacher. You will notice that there are often many varieties within a species – research the varieties that are native to your part of Ontario. You'll also notice that broadleafed trees produce hardwoods and coniferous needle-bearing trees produce softwoods.

Don't overlook the fact that your safety is of paramount concern – and your main focus in this activity. During your research, pay close attention to the property of the wood called "Sawdust Hazard". Aside from what fine sawdust can do to your body directly, certain sawdust concentrations in the air can be ignited by a spark or other source of ignition. Piles of woodchips outdoors in the hot summer sun have been known to spontaneously ignite.

If sawdust irritates your eyes, nose, skin or respiratory track, you may sneeze, wheeze or cough, get a rash or itch, runny nose or runny eyes. Sawdust as an irritant is the least of the sawdust evils. But repeated / prolonged exposures to a sawdust can result in sensitization to this dust of part of your body system – you could eventually develop an allergy and more serious long-term

conditions. A few species seem to even be carcinogenic, although proven cases are apparently rare.

Better to be well-informed – and safe – than sorry!

Investigate and Think Critically About This:

Ask yourself during your research – “*If I am working with this particular kind of wood, how can I protect myself and others from the sawdust hazard?*”

Differentiated Learning Ideas	
Abbrev	Description / Notes
DL-L	<p>For students with lower abilities.</p> <p>--Give these students all of the data below, except delete the cell-data in the Sawdust Hazards column for two or three species that you would like them to work with – the students will then research and find the missing data and fill in the empty cells</p> <p>--For students who are most interested in tools and working with wood, ask them to add a column for ‘Workability With Various Tools’ (eg handplane) – and then fill in that data for several species of interest.</p>
DL-M	<p>For students with moderate / mid-range abilities. This should generally be the default, always involving some level of critical thinking.</p> <p>--In the table below, delete all of the data in the Sawdust Hazards column – ask students to find this information and fill in the column.</p> <p>--Allow these students to fully research another species across the entire row – eg walnut, poplar or the species that will be used in your shop for a particular project. Ask them to add two or three more properties (ie new columns) that are of most interest to them – eg ‘response to oil finishes’; ‘density when dry’.</p>
DL-H	<p>For students with higher abilities or, ideally, "for any students who want to do more".</p> <p>--In the table below, delete the data in the Sawdust Hazards and Common Uses columns – ask students to find this information and fill in the columns.</p> <p>--For students who want to make a more profound connection with science or math class, ask them to add a column for density of the species (at a particular moisture content). Really keen students should be encouraged to design and conduct an experiment.</p> <p>--REACH-AHEAD OPPORTUNITY -- For students who are most interested in the biology of trees, ask them to add a column for moisture content when the wood is green in the springtime and then another column for moisture content when the wood is green in the autumn and ask them to hypothesize both on the difference in the time-of-year measurements and on the variation across a few species. This data collection will take much more independent research. Really committed students should be encouraged to design and conduct an experiment -- one that they will return to six months later for the second set of data. This research is obviously a significant reach-ahead opportunity for students to engage with industry experts.</p>

Note to teachers:

In the following table, delete as many rows as you wish in order to focus the different groups of students on the tasks that you believe to be best for them. Please also refer to the “Differentiated Learning Ideas” above.

Species	Hardness	Strength / Durability	Colour / Grain / Misc	Common Uses	Sawdust Hazards
Cedar	Soft	Highly resistant to exterior / damp conditions	Reddish-brown heartwood	Outdoor construction	Exposure to Western Red Cedar dust is well-known to result in a significant allergy or asthma
Hemlock	This softwood is harder than some hardwoods	Strong Uprooted hemlock trees still covered with bark can last years without much deterioration.	White-ish Stringy coarse-textured splintery grain Many hemlock stands still thrive in spite of the spruce budworm and other insects that seem to favour the hemlock in parts of Ontario.	Drive floors in barns (under horses and heavy machinery) General and exterior construction; crates; railway ties	Irritant Some sources also cite possible nasopharyngeal cancer (prolonged exposure)
Pine	Very soft	Low strength and low durability When felling, a large white pine tree will suddenly snap	Straw-coloured Very resinous Even-textured	“Canadiana” furniture for the common folk -“knotty pine” furniture has a certain appeal -pine stumps last over a century because of the dense resin in the heartwood of the stump and roots -carving, pulp	Mild irritant
Spruce	Moderately soft	Somewhat resistant to decay	White-ish	Construction (eg interior wall studding) Musical instrument soundboards	Prolonged exposure to this dust may result in an allergy
Ash	Hard	Springy, quite bendable, impact resistant Protect from insect attack	White-ish sapwood Light brown heartwood Now under serious attack by emerald ash borer beetle	Hammer handles, wagon axles and frames, baseball bats, skiis.	Mild irritant
Basswood	This hardwood is softer than some softwoods		White-ish / pale	Carving, modelling, food containers, pulp products	
Beech	Hard	Very strong Protect from insect attack	Creamy sapwood Red-ish heartwood	Planes and tool handles Flooring; furniture; woodenware; filtering	Prolonged exposure to this dust may result in a rare form of nasal cancer

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Species	Hardness	Strength / Durability	Colour / Grain / Misc	Common Uses	Sawdust Hazards
			Prone to a fungal infection; beech are now in serious decline in S. Ontario	vinegar Biscuits and dowels for joinery	
Birch	Hard	Moderately strong Protect from insect attack		Flooring, furniture, veneer, railway ties, vehicle stock --	Prolonged exposure to this dust may result in an allergy
Cherry	Moderately hard	Moderately strong While the heartwood is generally durable, water getting into the crotch of a tall black cherry tree will often result in complete breakage at the crotch of at least one of the two trunks.	Reddish brown heartwood	Furniture, cabinet work, decorative treatments	Mild lung irritation such as wheezing
Chestnut	Hard	Sapwood is resistant to decay. Some old chestnuts trunks in Scarborough that are hollowed out still stand and the tree foliage thrives year after year.	American chestnut was almost wiped out by a blight a century ago	Barn beams – great source of salvaged wood for unique projects	Irritant
Elm	Very hard	Strong	Grain is all over the place making elm difficult to split. Dutch elm disease has killed all elm in the Toronto area. Younger elms now on the rebound in rural Ontario may not last long.	Wagon wheel hubs	Mild irritant
Ironwood	Extremely hard	Strong	Very dense wood. In Ontario, also known as blue beech, an ironwood tree is seldom larger than 8 inches in diameter.	Farm machinery stock; tool handles, mallet heads.	

Species	Hardness	Strength / Durability	Colour / Grain / Misc	Common Uses	Sawdust Hazards
Maple	Hard	Strong	Bird's eye defect in some grain is highly desirable in furniture	Furniture, veneer, vehicle frames, flooring	Prolonged exposure to this dust may result in an allergy
Oak	Hard	Strong	Light brownish	Furniture, especially valued when quarter-sawn Boat building Pegs for barn frame mortise and tenon joints	Prolonged exposure to this dust may result in a rare form of nasal cancer
Poplar				Veneer backing, matches, boxes, pulp	Mild irritant
Walnut					Prolonged exposure to this dust may result in an allergy

2 Peer Assessment

NOTE: In the feedback, the Peer Assessor must “make the student think” – not give the student the answer! Be sure to include comments justifying the assessment value that you are giving. Peer Assessor must put his / her comments in **red** font. Hand in both your version 1 with peer comments and your improved version 2.

Assessor's Name and Additional Notes:

Go to Part 3:

Observation and Research: Processing Wood Using Tools; Sanding and Limitations (15.3_Wood_Dust_ProcessTools.doc)