Breaking up wood is hard to do …

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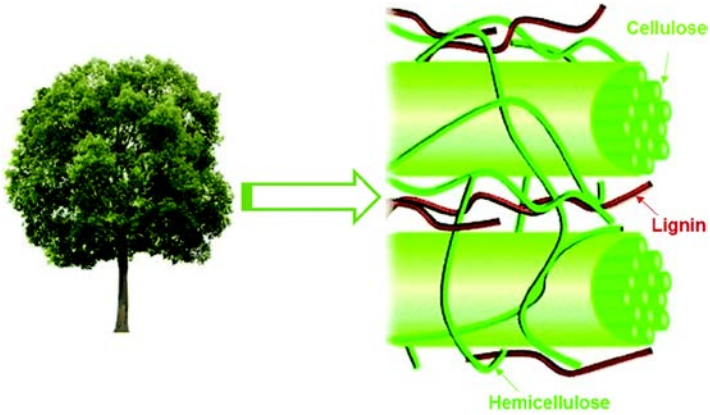
Lignin is the second most common natural polymer on Earth and is the stuff that makes wood strong, rigid and, well, woody. The strength comes from the chemical structure of lignin as it has long chains of carbon-carbon bonds (red in the diagram) that make long strands that interlink with the cellulose (green).



To be able to make biofuels and other valuable hydrocarbons from sawdust we need to be able to break up the lignin into smaller molecules and research chemists are now working out how to do this. They have developed a process which involves using a reactive chemical called a phosphinite with a rhodium metal catalyst. This new process still needs more work because the reactions need to be carried out in an oxygen-free environment which would be difficult to do on a large scale.

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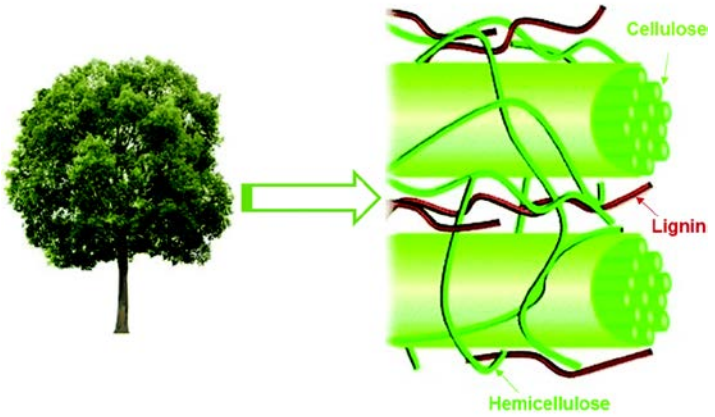

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1. What is the most common natural polymer on Earth? (Hint: it's biological too)
2. Find rhodium on the Periodic Table, what is its atomic number?
3. Lignin typically makes up 27% of the mass of a tree trunk, estimate the mass of lignin in a 63 kg piece of wood.
4. The first step of the process to break down lignin forms biphenols. What is the chemical structure of phenol? Suggest a structure for a biphenol.

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