

Re: why don't certain things liquify?

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- *From:* "Puppet_Sock" <puppet_sock@xxxxxxxxxxx>
 - *Date:* 14 Oct 2005 08:01:56 -0700
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metaperl@xxxxxxxxxxx wrote:

- > I would like to know why certain things (trees, humans, for example)
- > cannot be liquified or turned into gas. It seems that humans only
- > reduce to ash while water can be easily switched between water and gas.

Well, I smell homework, but what the heck. Please note that the following is all very loose and descriptive. If you want any accurate and quantitative description, you need statistical mechanics. That is often not taught till university, 2nd year or 3rd year.

Pure elements and pure compounds often have a melting point and a boiling point. Though some don't have a melting point at normal atmospheric pressure, such as CO₂. CO₂ turns from solid to gas at normal atmo.

Complicated objects, such as trees and humans, are made of many compounds. If you heat them, their internal nature changes in complicated ways. In some cases, some of the materials will melt, some will turn to vapour. Humans have some fat in them that will melt. Both trees and humans have water that will boil.

The different amounts of different compounds means that the behaviour of different parts of these objects are different under different temperatures. Bones behave very differently to soft tissue.

A solid can have very heterogeneous characteristics. The atoms in it are not moving very far, so complicated structures can be retained. The bonds that hold structures together are of energy that is far larger than the typical heat energy of a molecule.

A liquid is a very different thing. The atoms all have to move around with much less resistance than in a solid. The interactions between molecules have to mostly be within some range of energy for the liquid to be a liquid. If they get much stronger, then the liquid turns to a solid. If they get much weaker, the liquid

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turns to a gas. This range depends in a complicated fashion on the temperature of the compound, the content of the compound, and the pressure of the system. As mentioned previously, not all compounds have a liquid state at any given pressure.

In a liquid, molecules can bump around inside the liquid, and wander around. But they have a hard time getting out of the liquid.

A gas is a different thing again. The molecules in a gas are all interacting mostly by bumping off each other. There is little "sticking" of one molecule to another, at least for long times. If you get a compound hot enough, eventually most compounds will turn to a gas. They may undergo a variety of chemical reactions first. But eventually the heat energy of the typical molecule will be larger than the interaction energy. So the compound will lose any cohesive interaction. Any tendency of the molecules to clump will be overwhelmed by the heat energy of the molecules.

Socks

• **References:**

◆ **why don't certain things liquify?**

◇ *From:* metaperl

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