

Japanese scientists use alcoholic drinks to induce superconductivity

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Japanese researchers [have been immersing iron-based compounds](#) in hot alcoholic beverages such as red wine, sake and shochu to induce superconductivity.

Scientists from the National Institute for [Materials Science](#), Japan, found that immersing pellets of an iron-based compound in heated [alcoholic beverages](#) for 24 hours greatly increase their superconducting ability.

Iron-based compounds usually become superconductive after being exposed to air. This process however can take up to several months. This study demonstrated that [superconductivity](#) can be induced in just one day.

Due to the variety of technological applications of [superconducting materials](#), there has been a scramble for substances that may induce and enhance superconductivity in iron-based compounds.

The alcoholic beverages used were red and white wine, beer, Japanese sake, shochu, and [whisky](#). Samples of the iron-based compound were immersed in each beverage, heated at 70°C for 24 hours, and then analysed.

Red wine was shown to induce the best superconducting properties; however beverages with the same alcohol concentration showed a significant difference. This suggests that it may not be the alcohol contributing to the creation of superconductivity but instead another component present in the beverages.

Iron-based compounds undergo a process called magnetic order whereby the molecules align in a regular pattern. To achieve superconductivity, magnetic order must be suppressed. In order to become superconductive, the elements in the iron-based compounds must be substituted with elements present in alcohol.

The exact mechanism behind this effect is largely unknown however the researchers suggest that it may be due to the insertion of electrically charged particles into the layers of the compound.

An alternative theory is that the alcoholic beverages help to supply oxygen into the sample, which in turn causes superconductivity. A clearer understanding will be had by analysing the structure and composition of the beverages to identify the key factor in inducing superconductivity.

Professor Yoshihiko Takano, Nano Frontier Materials Group at the National Institute for Materials Science, Japan, said, "The iron compound becomes superconductive by air exposure but the sample needs to be exposed to air for a few months to show superconductivity. This is a very, very long time.

"However, the sample immersed in the [red wine](#) becomes superconductive only in one day, much faster than air-exposure."

More information: Alcoholic beverages induce superconductivity in $\text{FeTe}_{1-x}\text{S}_x$, K Deguchi et al 2011 *Supercond. Sci. Technol.* **24** 055008, iopscience.iop.org/0953-2048/24/5/055008

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