

Hot booze turns material into a superconductor

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(PhysOrg.com) -- A Japanese scientist who "likes alcohol very much" has discovered that soaking samples of material in hot party drinks for 24 hours turns them into superconductors at ambient temperature.

The scientist, Dr. Yoshihiko Takano of the National Institute for Materials Science (NIMS) in Tsukuba, Japan, made the discovery after a party, soaking samples of a potential superconductor in hot alcoholic drinks before testing them next day for superconductivity. The commercial [alcoholic beverages](#), especially wine, were much more effective than either water or pure alcohol.

[Superconductors](#) are metallic substances that allow electricity to flow through them with zero resistance below a certain temperature. Those found so far only work at very low temperatures (often as low as near [absolute zero](#)), and so finding one that works at room temperature could have important applications, such as power lines with superconducting cables, and perhaps in [levitation](#) of large objects like trains, since superconductors can repel magnetic fields. The phenomenon is still not completely understood even though superconductors have been known since their discovery in 1911 by a Dutch scientist Heike Kamerlingh Onnes.

The researchers created the samples of $\text{FeTe}_{0.8}\text{S}_{0.2}$ by sealing [iron](#) (Fe), tellurium (Te) and tellurium sulfide (TeS) powders into an evacuate quartz tube and heating the mixture at 600°C for 10 hours. This material is not normally a superconductor but can become one if exposed to

oxygen or if soaked in water.

After a party for a visiting researcher Takano wondered if the drinks they were consuming would work as well as pure water. To find out, they tested the $\text{FeTe}_{0.8}\text{S}_{0.2}$ samples with beer, red and white wine, Japanese sake, Shochu (a clear distilled liquor) and whisky, and with various concentrations of ethanol and water. The samples were all heated and kept at 70°C for 24 hours.

The results were that the ethanol-water samples showed increased superconductivity that was not dependant on the ethanol concentration. The samples heated in [alcoholic drinks](#) all showed greater superconductivity, but again not dependant on the alcohol content. Red wine was the most effective. The research team calculated the superconducting volume fraction of the samples and found they ranged from 23.1% for Sochu up to 62.4% for red wine, but none of the ethanol samples were over 15%.

The authors speculate that because wine and beer oxidize easily and since oxygen induces superconductivity in the material, the beverages could be playing an important role in supplying oxygen into the sample as a catalyst. Further research is needed to confirm the exact mechanism.

More information: Superconductivity in $\text{FeTe}_{1-x}\text{S}_x$ induced by alcohol, by Keita Deguchi, et al. arXiv:1008.0666v1 [cond-mat.supr-con] arxiv.org/abs/1008.0666

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