

Power of Pykrete

Sommer, Kyle (School: Woods Cross High School)

Pykrete, an ice alloy consisting of 86% water and 14% fiber by volume, is a cheap way of making structural material that doesn't impact the environment. The concept idea is the same as rebar and concrete. The fibers give flexibility and support while the ice gives rigidity and structure. Using different types of materials, the hypothesis is that wood pykrete will withstand the most compressive strength. 8.14 mL of sawdust, fiberglass, grass clippings, and toilet paper were frozen into disks of water. Under a hydraulic press, a computer tested the compressive resistance in kgf of each material 3 times. We gathered the peak resistance of each before a failure condition. On average toilet paper pykrete withstood the most pressure (159.923 kgf). Grass clippings withstood the least (31.367 kgf). The density of fibers, the direction they were pointing, and the flexibility of the material were factors in the results. The study showed that structural material can be built from naturally occurring substances. The lightweight 14% fibers can be used to build settlements on mars, make cryogenic boats, make bridges, and establish drilling sites near the poles. The lightweight nature of the materials cuts down on transportation and structural costs immensely. Further experiments could include melting rate, tensile strength, freezing rate, and buoyancy.