AN INNOVATIVE STUDY ON AEROGEL TECHNOLOGY

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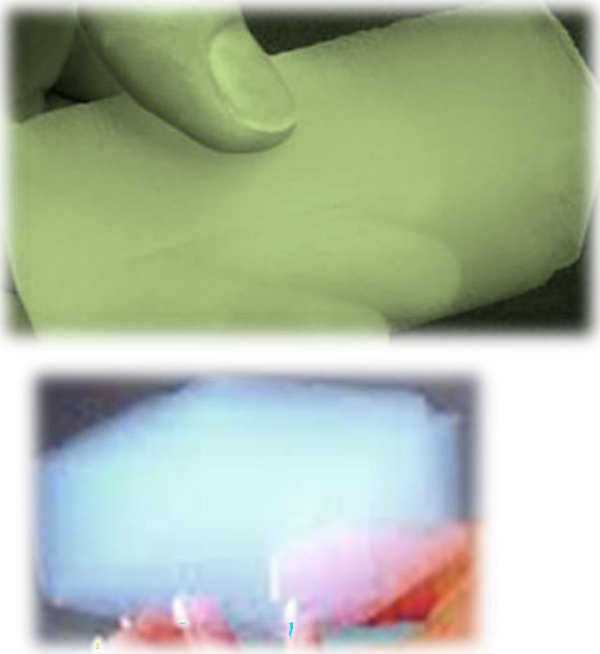
Abstract- There are many technology followed in civil engineering filed the AEROGEL is superior one. It is a special type solid material with wide range of application. It has good insulation capacity, fire resistance, light weight, water repellent. The material made up of aerogel like aerogel concrete, blankets, prefabricated panel, wall, windows are smatter and advanced material in construction. The main advantage is it capable to withstand 100 time greater load than its own weight.

Keywords- Aerogel, light weight, construction material

INTRODUCTION

Aerogel are first created in 1931. In that time it is more expensive one. Later in 1990's NASA research about and used it in space after that it become more popular. It is very low density and ultra light material. It is derived from a gel in which liquid component are replaced by gas. It is only three times dense as air. Areogel is also known as "frozen smoke". It is manufactured by extracting the liquid from gel through supercritical drying.

The first areogel is created by silica then it produced based on alumina, chromia. The carbon aerogel are produced from 1980's. They produced through "sol-gel" process.

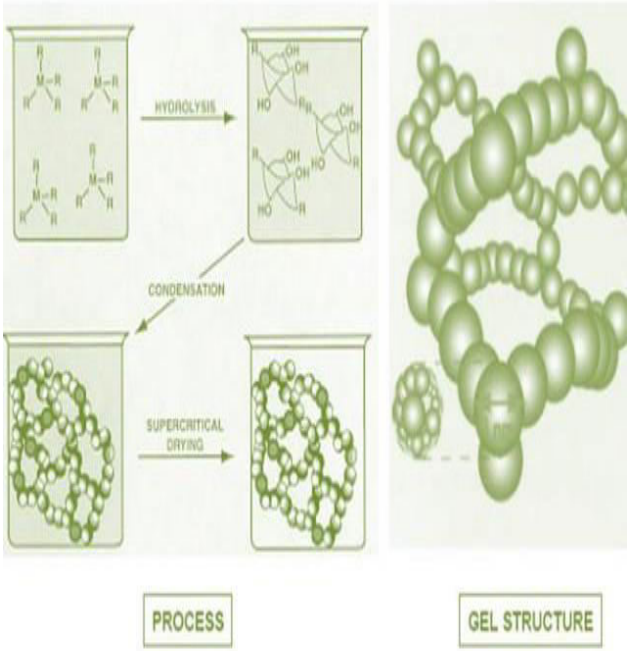


Aerogel

SOL-GEL PROCESS

The aerogel manufacturing process is called "sol-gel" process. The sol is colloidal suspension of solid practical. The silicon alkoxide is mixed with ethanol as solution. A catalyst is added

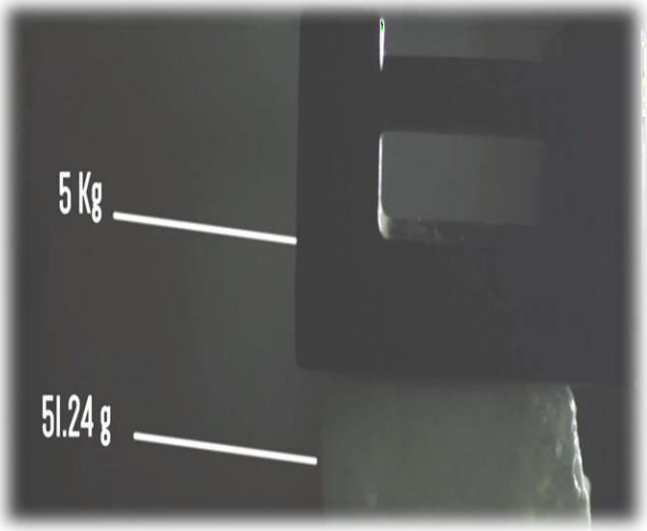
and allow to gel during hydrolysis. Then undergo condensation reaction to create metal oxide bridges. This process is generally slow to moderate so we added a acidic or basic catalyst to speed up the process. Finally the supercritical drying process is carried out. In this supercritical drying the liquid in the get allows evaporate and replaced by air. To improve mechanical property fiberglass has been added.



In new technology the aerogel is made by rise husk. It contains 95% air are rest are silica. The chemical composition is silicon dioxide from rice husk ash. It is biodegradable.

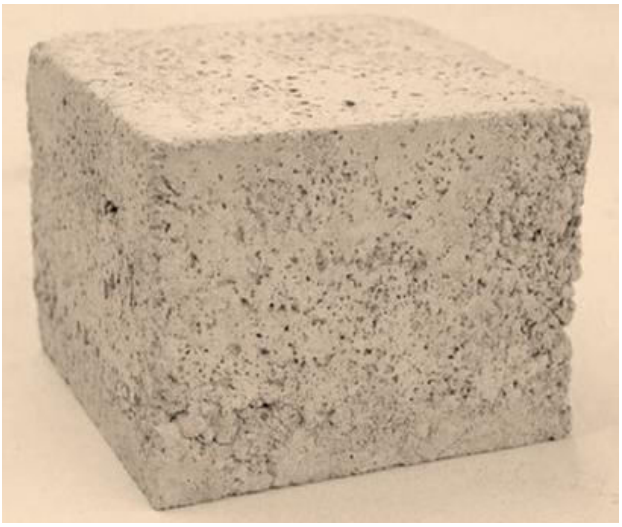
PROPERTIES OF AEROGEL

- ✓ Low thermal conductivity
- ✓ Hardness
- ✓ Heat resistance
- ✓ Transparency
- ✓ Elasticity
- ✓ Low density
- ✓ Durability
- ✓ Flexibility
- ✓ The melting point is 1200°C
- ✓ Capable to withstand 100 time greater load than its own weight.
- ✓ It floats in water due to light weight.
- ✓ It absorbs moister three times its weight.
- ✓ Water repellent.
- ✓ Shield against radiation.
- ✓ Fire proof



Load carrying capacity

Fire resistance



Aerogel concrete

APPLICATION

Aerogel have many advantanges in properties, so it have plenty of application.

Aerogel concrete

A concrete made of aerogel is used in construction of houses is become light weight, high thermal insulation and greater compressive strength. It will used in some countries in construction of G+2 residential structure.

Prefabrication panels

The same method should be followed in aerogel concrete but we made it as prefabricated. It is ultralight so easy to transport and placing. Due to greater load carrying capacity give more stability to structure.

Wall and window

The wall panel are transparent so we used it for energy saving and it helps in architecture view. We provided aerogel in between of wind glazing for insulation.

Insulation blankets

Aerogel insulation blankets are good in thermal and sound insulation. Also used for floor, roof proofing. Due to good water repellent property it used for water proofing.

Architecture works

We use it in external wall for decoration purposes, it have very stable to withstand the weather condition. It give aesthetic view to the structure.

CONCLUSION

The aerogel has much unique property so it offers plenty of application. The low thermal insulation is extraordinary and the flexibility in the blankets is increases in workability. It mainly reduce the emission of green house gas.In early day it may be expensive but we compare to plenty of application and increased mechanical property amount is reasonable. Definitely we say that aerogel is smatter material and eco friendly. It fulfill the all use need like cost, flexibility, insulation, self weight, load capacity. There are plenty of application are in aerogel but it s time is not coming we hope that soon as it become a common material.

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