surface area, while the BJH pore volume increases when compressed under a pressure of 10 kN m^{-2} to 20% of the original thickness. Thus, it indicates that compression affects the macroporous rather than the mesoporous structure. It was found that compressed aerogels become flexible and could be many times reversibly bent by an angle of 180°. Alginate aerogels are produced by 102 induced gelation because as viscoplastic material aerogels, biopolymer aerogels can be converted into flexible materials by compression retaining the porous characteristics of the original aerogels at the meso level.

4.3.1.4 Thermal Conductivity and Absorption

Low thermal conductivity is an attractive property. Thermal conductivity measurements were conducted by the hot-wire method. This method revealed excellent thermal insulation properties, i.e., thermal conductivity was measured to be in the range of (18–22) ± 2 Mw M^{-1} K^{-1}. A unique feature of alginate aerogels is that they absorb more saline compared to distilled water, in contrast to the behavior of regular superabsorbents. For example, a gram of alginate aerogel absorbs as much as 120 g of saline (0.9 wt% aq NaCl solution) solution compared to 20 g of distilled water.

4.3.2 Preparative Methods

Aerogel production consists of multiple steps that include gelation, soluent exchange, and supercritical drying (Sc-drying). Hydrogel produced through gelation acts as a precursor for the production of aerogel. Here we discuss the preparation of alginate aerogel under the assistance of CO_2 as an alternative catalyst.

Materials required are sodium alginate (Alg), calcium carbonate, ethanol 99.9%, and carbon dioxide with 99.9% purity. Deionized water was used throughout the study. Alginate solution was prepared by sodium alginate powder with an appropriate amount of water overnight and stored at 218 K. Calcium carbonate was suspended in water by vigorous mixing for about 5 min. While mixing, a certain part of the suspension was bled off and immediately transferred into the alginate solution to reach the target Alg–$CaCo_3$ ratio. The suspension obtained was again mixed for 2 min until they became homogenous. All suspensions thus prepared were transferred into Petri dishes and placed into a 25-L autoclave for subsequent gelation. The autoclave was pressurized with gaseous carbon dioxide up to 5 MPa at 298 K. The pressure was maintained for 12 hours and then slowly released. Hydrogels formed were either transparent or translucent. The hydrogels