

or polysaccharide-based aerogels brought an opportunity to expand the concept of medication. Polysaccharides are biopolymers. Biocompatible and biodegradable properties of polysaccharides enable their application in the world of pharmaceuticals and other biomedical applications; unlike hydrogel, alginate-based aerogels are well known for their open-porous structure, high surface area, and pore volume. Alginate hydrogels discussed above are more saline compared to distilled water and thus show a deviation from regular superabsorbent behavior. These special characteristics brought them into the field of aeronautics, energy conservation, biomedicine, drug delivery systems, photovoltaics, nanotechnology, acoustics, etc.

4.3.1 Properties of Alginate Aerogels

4.3.1.1 Bulk Density and Pore Volume

Bulk density and BJH (Brunauer-Joyner-Halenda) pore volume were determined from linear dimensions and desorption branches of N_2 isotherms, respectively. Values of specific volume lie between 4.17 and 16.7 $\text{cm}^3 \text{g}^{-1}$ indicating only 40–62% of the overall. Porosity can be attributed to the volume of mesopores. Thus, micro- and macroporosity may be present. Detailed studies show that only meso- and macropores are present in alginate aerogels. La-alginate aerogel has the highest BJM pore volume of $4.10 \pm 0.78 \text{ cm}^3 \text{g}^{-1}$. Two factors affecting pore volume have been considered. First, pore volume increases when solution becomes more and more diluted since the volume of empty space possessed by the aerogel increases consequently. Second, stiffness of the backbone decreases with decreasing alginate concentration. The latter factor is probably applicable to gels derived from 0.25 wt% alginate.

4.3.1.2 Specific Surface Area

The potential adsorption capacity of aerogels depends not only on the pore volume but also on the specific surface area. Typical values for alginate aerogels were observed as 151.857 $\text{cm}^2 \text{g}^{-1}$. The highest surface area reported was $608 \pm 60 \text{ m}^2 \text{g}^{-1}$. Both the surface area and pore volume were found to increase with increasing alginate concentration within the range of 1.5 to 3 wt%.

4.3.1.3 Compressibility

Compressibility is one of the interesting properties of alginate aerogels produced by 102 induced gelation. The sample retains almost the same