

Carbon gels can be used to synthesize extremely porous materials. This can lead to high specific surface area. Producing these materials can be done with resorcinol and formaldehyde, with a catalyst. Materials with very different properties can be achieved simply by varying the pH of the initial solution. The impact of this stage can be seen primarily in the mechanical properties of the material. After letting the ingredients gel the material is dried in supercritical conditions. The solvent of the initial solution can be substituted with a more suitable one for drying. Subcritical drying can also be used to produce xerogels. After that the materials are then pyrolyzed. This stage is for removal of unwanted substances from the formed carbon structure. Still, this part of production can also have an effect on the pore volume. Even more properties can be varied using different activation methods (e.g. ball milling). The characteristics of carbon aerogels that can be altered include pore distribution, pore volume, surface area. (¹; ²)

By controlling the initial conditions the properties can be altered greatly. This on the other hand leads to the threat that minor mistakes in the synthesis can lead to big faults in material. The major contributors to the effects on the latter properties (e.g. pore volumes, pore areas) are the concentrations of the precursors. This also has an effect on the gelling properties (e.g. gelling time, physical appearance). Because of this the synthesizing conditions need to be known thoroughly. (¹; ³; ⁴)

To change the electrical properties of carbon aerogels doping can be used. (⁵)

¹ Al-Muhtaseb, S. A. & Ritter, J. A. (2003) Preparations and Properties of Resorcinol - Formaldehyde Organic and Carbon Gels. *Adv. Mater.* 15(2), 101-114.

² Amaral-Labat, G., Szczurek, A., Fierro, V., Pizzi, A., Masson, E., Celzard, A. (2012) "Blue glue" - A new precursor of carbon aerogels. *Microporous and Mesoporous Materials*, 158, 272–280

³ ElKhatat, A. M. & Al-Muhtaseb, S. A. (2011) Advances in Tailoring Resorcinol-Formaldehyde Organic and Carbon Gels. *Adv. Mater.* 23, 2887-2903.

⁴ Zubizarreta, L., Arenillas, A., Domínguez, A., Menéndez, J. A., Pis. J. J. (2007) Development of microporous carbon xerogels by controlling synthesis conditions. *Journal of Non-Crystalline Solids*, 354, 817–825.

⁵ Maldonado-Hódar, F. J. (2013) Advances in the development of nanostructured catalysts based on carbon gels. *Catalysis Today*. 218– 219, 43– 50.