

*Dedicated to the memory of Yuriy Grigor'evich Yatluk*

## Template synthesis and sorption of water vapor by porous silica gels with a high specific surface area

© Igor S. Puzyrev,<sup>1\*</sup> Egor P. Sobina,<sup>2</sup> and Sergey V. Medvedevskih<sup>2</sup>

<sup>1</sup> I.Ya. Posyovsky Institute of Organic Synthesis, UB of RAS. Kovalevskaya St., 22. Ekaterinburg, 620990.

Russia. Phone: +7 (343) 362-34-39. E-mail: [igor.puzyrev@mail.ru](mailto:igor.puzyrev@mail.ru)

<sup>2</sup> Urals Scientific Research Institute of Metrology. Krasnoarmeyskaya St., 4.

Ekaterinburg, 620000. Russia. Phone: +7 (343) 350-26-18. E-mail: [sobina\\_egor@uniim.ru](mailto:sobina_egor@uniim.ru)

\*Supervising author; <sup>+</sup>Corresponding author

**Keywords:** *silica gels, micropores, mesopores, adsorption of water.*

### Abstract

With mixed surfactants of primary distilled alkylamines as template agents and tetraethylorthosilicate as a silica source, micro- and mesoporous silica gels were synthesized in basic medium. Characteristics of porous silica gel were studied by the low-temperature nitrogen adsorption-desorption. Specific surface areas of microporous silica gels are 1055 or 1392 m<sup>2</sup>/g depending on calcination conditions, mesoporous silica – 887 m<sup>2</sup>/g, and the pore volumes are 0.82, 0.68 и 0.81 cm<sup>3</sup>/g, respectively. SEM images exhibited lamellar structure of microporous, and spherical shape of mesoporous silica gels. The adsorption isotherms of the water vapour on the silica gels were investigated. The larger specific area of microporous silica gel provides the greater adsorption value.