

Gas Adsorption Capability of Hybrid Polymers with Modified Cyclodextrin-amorphous Silica

Fumio HAMADA^{***} and Manabu YAMADA^{**}

^{*} Centre for Crystal Growth, Vellore Institute of Technology, Velloore-632014, Tamil Nadu, India.

E-mail: fumio.hamada@vit.ac.in

^{**} Applied Chemistry Course, Department of Materials Science, Graduate School of Engineering Science, Akita University, 1-1 Tegatagakuen-machi, Akita 010-8502, Japan

E-mail: hamada@gipc.akita-u.ac.jp

E-mail: myamada@gipc.akita-u.ac.jp

Cyclodextrins (CDs) are well-known macrocyclic compounds in the fields of supramolecular and molecular recognition. For use as separation and adsorption materials, the water-soluble CDs must be modified into solid forms. Hybrid polymers consisting of amorphous silica and modified α - or β -CDs (propyl-modified α -CD, butyl-modified β -CD, and ethylenediamine modified- β -CD), designated as propyl- α -CDP (**2**), butyl- β -CDP (**3**), and EDA- β -CDP (**4**), respectively, were prepared, and their adsorption capacities for CO₂, CH₄, and H₂ were evaluated. The α -CDP (**1**), which was derived from α -CD shows no adsorption capability for all gases examined. On the other hand, compound **2** exhibited the maximum CO₂ adsorption of about 18.0 ml at \sim 500 kPa. Compound **4** adsorbed the maximum amounts of CH₄ and H₂ (about 7.5 and 4.0 ml, respectively). In contrast, the **3** demonstrated almost no adsorption capability for CH₄ or H₂ molecules, adsorbing only CO₂ gas.

Keywords : Hybrid polymer, cyclodextrin, gas adsorption, amorphous silica