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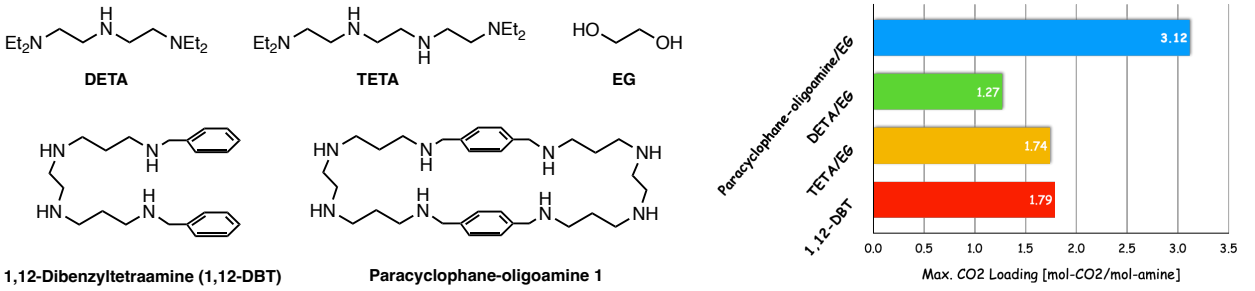
Evaluation of CO_2 Absorption Performance of Paracyclophane-oligoamine in Ethylene Glycol Solution

Nobuhiro Kanomata,[a,*] Nao Senga[a]

[a]*Department of Chemistry and Biochemistry, Waseda University, 3-4-1 Shinjuku-ku, Tokyo 196-8555, Japan*

Abstract

Carbon dioxide capture and storage (CCS) is widely recognized as an essential strategy to mitigate global warming in the 21st century. Our previous studies have shown that amine-ethylene glycol (EG) solutions exhibited excellent CO_2 absorption performance attributable to EG's abilities both to form carbonates and to enhance carbamate formation in those amines. [1)]
In this study, we synthesized a cyclophane-amine **1**[2)] bearing eight secondary amine moieties in its bridging chains as a promising candidate for CO_2 capture. Under simulated flue gas conditions (13% CO_2 in N_2), we investigated the CO_2 absorption and desorption properties of **1** in an EG solution. Consequently, approximately 80% of its amino groups participated in CO_2 chemisorption, achieving a CO_2 absorption capacity of 3.12 mol- CO_2 /mol-amine surpassing those of DETA (1.27 mol- CO_2 /mol-amine), TETA (1.74 mol- CO_2 /mol-amine), and 1,12-dibenzyltetramine (1,12-DBT), thereby highlighting its remarkably high absorption capabilities.



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* Corresponding author. Tel.: +81-3-5286-3193
E-mail address: kanomata@waseda.jp