Supporting Information

Absorption Mechanism and Polarity-induced Viscosity Model for CO₂ Capture Using Hydroxypyridine-based Ionic Liquids

Xiaowei An¹, Xiao Du¹, Donghong Duan¹, Lijuan Shi¹, Xiaogang Hao¹*, Houfang Lu², Guoqing Guan*³, Changjun Peng⁴

¹Department of Chemical Engineering, Taiyuan University of Technology, Taiyuan 030024, P. R. China

²College of Chemical Engineering, Sichuan University, Chengdu 610065, P. R. China

³North Japan Research Institute for Sustainable Energy (NJRISE), Hirosaki University, 2-1-3 Matsubara, Aomori 030-0813, Japan

⁴State Key Laboratory of Chemical Engineering and Department of Chemistry, East China University of Science and Technology, Shanghai, 200237, P. R. China
Fig. S1 TG and DTG plot of $[P_{4444}]^{2-}[2\text{-Op}]$ with a heating rate of 10°C/min.

Fig. S2 Van't Hoff plots of fitted equilibrium constants for CO$_2$ with $[N_{4444}]^{2\text{-Op}}$ and $[N_{4444}]^{3\text{-Op}}$. 

$R^2=0.98$

$R^2=0.99$
**Fig. S3** Van't Hoff plots of fitted equilibrium constants for CO$_2$ with [P$_{4444}$][2-Op] and [P$_{4444}$][3-Op]. The lines are drawn to guide the eye.

**Fig. S4** Optimized structures of [P$_{4444}$][2-Op], [P$_{4444}$][3-Op] and [P$_{4444}$][4-Op] at the B3LYP/6-311++G** level of theory.
NMR Data

$[\text{P}_{4444}\text{[2-Op]}$]

$^{31}\text{P NMR (500 MHz, DMSO-d6): } \delta 46.00, 37.66, 33.80$

$[\text{P}_{4444}\text{[2-Op]}+\text{CO}_2$

$^{31}\text{P NMR (500 MHz, DMSO-d6): } \delta 46.00, 37.65, 33.78, 31.48$