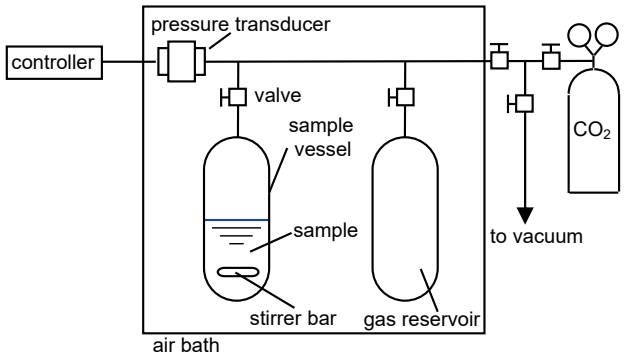
Towards the realization of carbon neutrality
– Analytical technology for CO_2 separation and capture –

Toward a globally decarbonized society, carbon neutrality which is the positive/negative zero emission and absorption of CO_2 is gaining importance in various fields. In particular, negative emission technologies that capture and remove CO_2 is essential for the realization of carbon neutrality. We can evaluate the CO_2 absorption amount and absorption heat using our original measuring system.

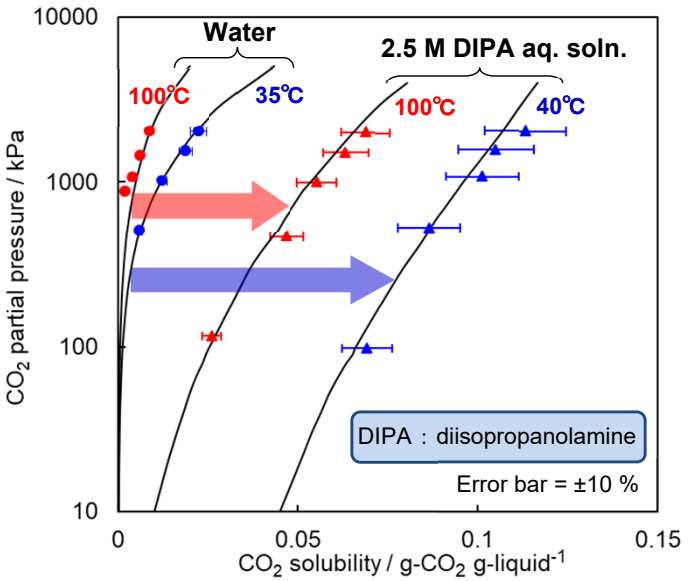
CO_2 absorption amount

~ Effect of DIPA (diisopropanolamine) addition on water ~



The CO_2 adsorption amount of the sample is determined by introducing CO_2 into the apparatus at a predetermined pressure, then subtracting the CO_2 amount in the empty part of the sample vessel from the incremental weight.

Under high temperature (~180℃) and high pressure (~7 MPa) are available.

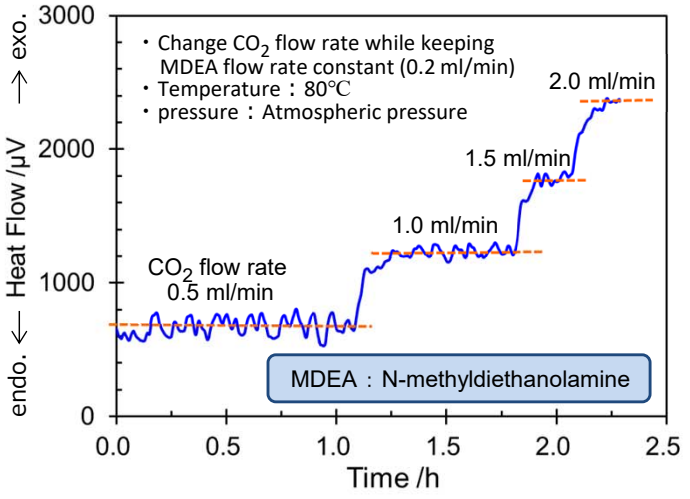


- Adding DIPA to water dramatically increases CO_2 absorption amount.
- The measurement values (dot) show good agreement with the literature values* (solid line) within ±10 %.

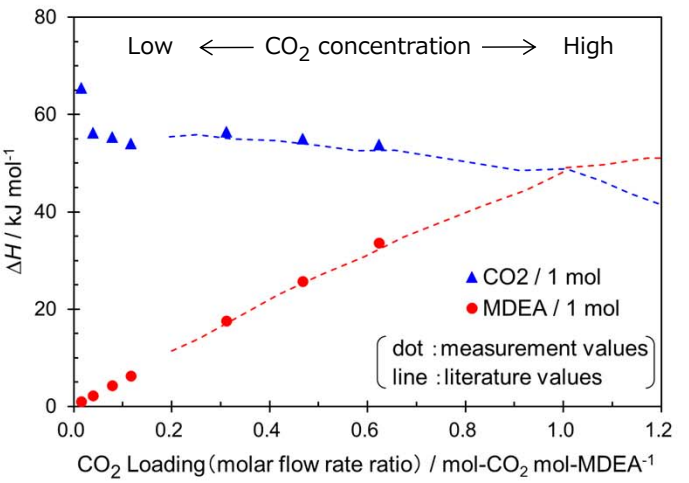
*E. E. Isaacs *et al.*, *J. Chem. Eng. Data* **22(1)**, 71-73 (1977).

CO_2 absorption heat

~ The CO_2 absorption heat of 30 % MEDA aqueous solution ~



- Syringe pumps are uniquely connected to the calorimeter, and both MDEA and CO_2 are flowed to measure the absorption heat (flow calorimetry method).
- With a rise in the CO_2 flow rate, the exothermic reaction of CO_2 absorption progresses.



- With a rise in the CO_2 concentration, the heat value per unit mol of MDEA increases while that keeps almost constant per unit mol of CO_2.
- The measurement values are in good agreement with the literature values‡.

‡ C. Mathonat *et al.*, *Fluid Phase Equilib.* **140**, 171-182 (1997).

Absorption amount and heat of CO_2 absorbent are particularly useful for highly efficiency selective absorption and separation by CO_2 chemical absorption methods in CCS (Carbon dioxide Capture and Storage).

Analysis menu of CO_2 absorbent
- CO_2 absorption amount/heat
- CO_2 concentration
- Viscosity
- Vapor pressure
- HSP
- Surface tension
- Density, etc.

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