



Research Institute of Innovative
Technology for the Earth

Research Institute of Innovative
Technology for the Earth (RITE)

Location

Kyoto, Japan

Mission

- To work internationally toward developing innovative environmental technologies
- R&D activities particularly for the mitigation of global warming, including R&D on carbon dioxide capture and storage, biorefinery technologies, scenario studies on the paths for mitigating global warming, and innovative technologies based on inorganic membranes.

Sponsor

- Ministry of Economy, Trade and Industry (METI)
- New Energy and Industrial Technology Development Organization (NEDO)
- Others

Website

<http://www.rite.or.jp/en/>

Contact

Dr. Teruhiko Kai, Senior
Researcher

Dr. Hidetaka Yamada, Senior
Researcher

Chemical Research Group, RITE
9-2 Kizugawadai, Kizugawa-shi
Kyoto 619-0292 JAPAN

Phone: +81-774-75-2305

E-mail: kai.te@rite.or.jp

hyamada@rite.or.jp

RITE studies the different CO₂ capture technologies with a special focus on chemical absorbents, solid sorbents and membranes. RITE conducts R&D on the development of new materials and processing methods, as well as investigations of capture systems.

Chemical absorbents

RITE developed high performance chemical absorbents*, and one such chemical absorbent with particular promise was selected for application in a commercial CO₂ capture plant owned by a private Japanese company. This CO₂ capture plant has been in operation as the first commercial plant, and in 2018, a second commercial plant is scheduled to begin operations.

*CO₂ Ultimate Reduction System for Cool Earth 50 (COURSE50) Project/NEDO

Solid sorbents

RITE has been developing solid sorbents to efficiently reduce energy consumption for CO₂ capture. Novel amines synthesized by RITE have been employed for the low-temperature regenerable solid sorbent. In lab-scale cyclic tests, our novel solid sorbent is capable of achieving 1.5 GJ/t-CO₂ in regeneration energy. And, we have established a large-scale synthesis technology that can produce 10-m³ solid sorbents per batch. Currently, bench scale test is now underway by the moving bed system in collaboration with a private company.

Membranes

Membrane separation is expected as an effective means of separating CO₂ from high-pressure gas mixtures at low cost and with low energy. As a member of the Molecular Gate Membrane module Technology Research Association (MGMTRA), RITE has been developing membranes and membrane modules based on novel dendrimer/polymer hybrid membrane, called the molecular gate membrane, to selectively capture CO₂ from pressurized gas at low cost and with low energy. Major application of the molecular gate membrane modules is CO₂ capture from the gas mixtures containing H₂ and CO₂, generated in the integrated coal gasification combined cycle (IGCC).



Fig. 1 Snapshot of the first commercial plant for supplying CO₂ as industrial gas.

*The construction site is the Nippon Steel & Sumitomo Metal Corporation.

*The photo is provided from Nippon Steel & Sumikin Engineering Co., Ltd.

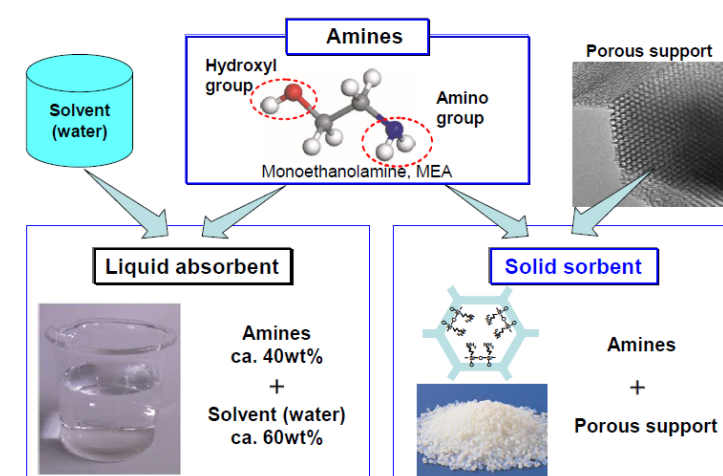


Fig. 2 Liquid absorbent and solid sorbent.

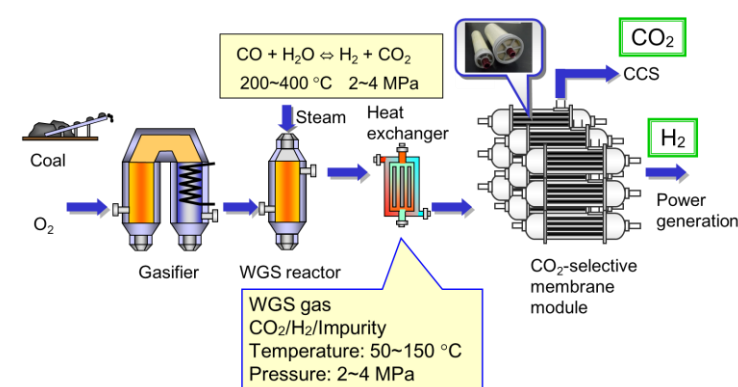


Fig. 3 Schematic of the IGCC process with CO₂ capture by CO₂ selective membranes.