

GEOCHEMICAL INTERACTIONS BETWEEN CO₂, PORE-WATERS AND RESERVOIR ROCKS

*Lessons learned from laboratory experiments, field studies and
computer simulations*

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Abstract: The degree of reactivity between CO₂, pore-waters and minerals may have significant consequences on CO₂ storage capacity, the injection process, and long-term safety and stability. Geochemical reactions are highly site-specific and time-dependent. They need to be assessed on a site-to-site basis according to best practises by combining numerical modelling and observations from laboratory experiments, field monitoring, and natural analogues. A selection of lessons learned from three European projects about the reactivity of CO₂ with reservoir rocks and cap rocks is presented here for three sites: Sleipner (Norway) and Weyburn (Canada) where more than 1 Mt of CO₂ per year has been injected underground since 1996 and 2000 respectively, and Montmiral, a natural CO₂ field in France.

Key words: CO₂ geological storage, geochemical studies, reactivity, reservoir, cap rock, experiments, modelling, CO₂ trapping, Sleipner, Weyburn, Montmiral.

1. INTRODUCTION

The capture and geological storage of CO₂ is increasingly seen as a viable strategy to reduce the release of greenhouse gases to the atmosphere (IPCC, 2002; OECD/IEA, 2004). The injection of a relatively reactive substance such as CO₂ into the deep subsurface will result in chemical disequilibria and the initiation of various chemical reactions. This paper gives an overview of the potential impact of geochemical reactions, based on