Inverse modeling in a CO_2 natural analogue – long term processes in carbon dioxide storage

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To guarantee the long term safety of the geologically stored CO_2, long timescale behavior of the CO_2-rock-porewater system must be well understood. The most suitable way to describe a future CCS system is study of long-term natural CO_2 accumulations and their footprint on the mineralogical and fluid compositions. One of these natural CO_2 occurrences is in the western part of Hungary, in the Little Hungarian Plane, where the studied system is composed by 38 reservoirs (26 CO_2, 10 hydrocarbon, and 2 mixed gas). The carbon dioxide is produced since 1948 for industrial purposes. The CO_2 is contained by the (late Miocene) Pannonian sedimentary sequence of a prograding delta system (mainly sandstone, siltstone and clay), in a depth of about 1400 m.

Based on the mineralogical composition of the available core samples and water chemistry data from the studied area, and using mineralogical composition of a CO_2-free brine containing sandstone from the same formation, a geochemical modeling was applied with the PHREEQC program to reproduce the observed effects and determine the major fluid-rock interactions which could have taken place in the reservoir. These interactions are believed to have a major impact on long term safety of carbon dioxide geological storage as they may strongly affect the petrophysical parameters of storage and sealing lithologies.

The work was carried out in collaboration between Eötvös University and Geological and Geophysical Institute of Hungary.

Geochemical and petrographical investigation of chromite occurences in Burdur-Salda, Turkey

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Lithological units in research area from oldest to youngest are Cretaceous aged ophiolites, intrusive gabbros in ophiolites, sedimantary units mostly composed of limestones and Quaternary aged alluvials.

There are four types of chromite ocurrences in the area. These are massive, nodular, disseminated and banded ores. Chromite ores which include Cr_2O_3 from 18% to 50% were bedded in podiform type. Slope directions of masses are different in northern and southern parts. It is estimated that this diffrences of slope depend on faulting in the region. Chromite deposits are can be seen in the outcrop, have continuities in the strike and dip directions and in the form of extensions of each other. Chromite deposits in the middle and edge parts of the ophiolitic series are small and individual appearances.

Samples from the research area were analized for determining the petrographical and geochemical characteristics. Samples were taken from the research region are examined according to major oxide contents to determine geochemical content ratio of this units.

The percentage of SiO_2 is between 10% an 31% and Al_2O_3 content is approximately %3-3,6. N39, which is one of five samples tested to establish Fe_2O_3 content, have the highest Fe_2O_3 content is 15,972%. It is seen that the sample is rich on account of Cr_2O_3 with the percentage of is 50,181. Moreover, the content of CaO was determined between 0,02% and 0,5% for all samples.

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DOI:10.1180/minmag.2013.077.5.11