

## Dissolution of oil well cement in presence of CO<sub>2</sub>/H<sub>2</sub>S under HTHP

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### Introduction

The cement material used in the construction of deep oil well reservoirs is frequently exposed to high temperatures and pressures (HTHP) and to the corrosive action of gases like CO<sub>2</sub> and H<sub>2</sub>S, presents in the media, that can alter its properties. According to the criterion of Nickel (1995), the cementing material can be considered as a mineral mixture. In this study the interactions between the cement material and CO<sub>2</sub>/H<sub>2</sub>S are investigated to establish a method for optimal selection of cylindrical cement samples of two different dimensions (1" x 2" and 1/2" x 1").

### Methods

Samples were exposed to the action of a mixture of CO<sub>2</sub>/H<sub>2</sub>S, dissolved in water, in a Parr reactor for HTHP (T= 160 °C; P<sub>CO2</sub>= 37.77 atm; P<sub>H2S</sub>= 16.33 atm; P<sub>T</sub>= 102.07 atm) to compare their dissolution rates on laboratory scale and chose the most suitable geometry. The reaction times were 1, 3 and 7 days. The test solution was analyzed by Inductive Coupled Plasma -ICP- (elements) and Ionic Chromatography (anions). Dissolution rates were calculated and the Na/Ca and K/Ca relations were compared.

### Results and Conclusions

After performing laboratory tests, it was observed severe damage (leached) in the samples exposed to the mixture of CO<sub>2</sub>/H<sub>2</sub>S within different time scales. The results obtained for Na, K, Ca, suggested that 1/2" x 1" samples show important benefits in terms of time laboratory constraints compared with the 1" x 2" dimensions. This statement is strongly supported by a chemical study. These results will be used in further studies of mechanical properties and mineralogical composition of cement material in aggressive conditions.

### Reference

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## Geochemical feature of chlorites in No. 201 and No. 361 uranium deposit, South China

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The No.201 and No.361 uranium deposits are genetically related with the Zhuguang granite pluton. Chloritization was one of major hydrothermal alterations and some chlorites were very closely associated with uranium mineralization. Chemical compositions of the chlorites analyzed from EPMA are: SiO<sub>2</sub> = 28.81~22.20%, Al<sub>2</sub>O<sub>3</sub> = 22.38~15.79%, FeO = 39.74~26.18%, and MgO = 15.45~3.47%, attributed mostly as prochlorites or ferromagnesian chlorite. They are Fe-rich species and formed under a relatively reductive environment. However, the wider range of FeO and MgO concentrations indicated that some of the chlorites might formed from an Fe- and Mg-enriched fluid.

In the n(Mg)/n(Fe+Mg) vs. n(Al)/n(Al+Mg+Fe) diagram (Laird, 1988), most chlorites have a source of argillaceous rocks, which was the source of the granites in that area. But less chlorites seem to have sources similar to mafic rocks or related fluids. The forming temperatures of chlorites were calculated from the T-d001 equation of Battaglia (1999). Chlorites in granite formed at 276~220°C, while those related to later diabase dyke 241~169°C.

It is postulated that there are two forming mechanisms of chlorites in the studied area. One was resolving-precipitating, and the other was resolving-migrating-precipitating. The later was represented by the chlorite veinlets occurred in the fissures. The close spatial relation between these chlorite veinlets and uranium ore revealed that the chloritization in these two deposits not only reactivated and transported uranium from granite, but can also adsorb and precipitate the uranium to form ore-bodies.

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### References

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