The petrological, geochemical and tectonic setting of metabasites from Mashhad, North East of Iran

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Metabasites of Mashhad area are part of Virani (Nourabad) Ophiolite in the Binaloud region. The ophiolite extends to Aghdarband area, north east of Fariman. Ultramafic rocks are predominantly peridotite (lherzolite, wherlite and hursburgite). Mafic rocks are mainly metabasalt, metagabbro and metadolerite. Large pillow lavas (>45 Cm in diameter) crops out in Zakaria and Nowdarreh areas.

Metabasites subjected to a low to medium grade metamorphism (greenschist to amphibolites facies), characterized by Ab + Act + Epid + Chlo; Na-Plag + Hbld + Epid and Ca – Na Plag + Hbld assemblages. Plagioclase (Ab to Ande), Amphiboles (Actinolite and Hornblende), Epidote, Chlorite, Quartz, Sphene, Apatite and Iron – Oxides are the most common minerals of metabasites.

Selected samples have analysed by XRD, XRF and ICP methods. Major and trace elements data indicates that metabasites are tholeiitic in nature and characterized by low potassium (0.25 wt%), and high magnesium (maximum 23.23 wt%), high chromium (maximum 2110 ppm), and high nickel (maximum 2970 ppm) contents. The metabasite samples have low Zr/TiO2 (0.0011 – 0.0092) and Nb/Y (0.06 – 0.15) ratios, similar to those of tholeiitic basalts.

The Metabasites of Mashhad area are believed to be remnant of the Paleo – Tethys oceanic plate that were subducted beneath the Turan plate. Later on the Turan plate have obducted over the Iranian Micrcontinent, and formed the northeasten Iran.

Importance of syntrophic acetate oxidation during thermophilic municipal solid wastes anerobic digestion

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During anaerobic digestion of organic matter, acetate and H_2/CO_2 are expected to be responsible of around 67% and 33% of the methane production respectively [1]. Our results show that temperature has a significant influence on methanogenic pathways as indicated by the different CH_4 isotopic composition ($\delta^{13}CH_4$) evolutions observed under mesophilic and thermophilic conditions. The contribution of the hydrogenotrophic pathway appears to be much more important in thermophilic condition due to the occurrence of the syntrophic acetate oxidation (SAO) reaction.

Using different molecular microbiological tools (Fluorescent *in situ* hybridization and cloning sequencing) microbial communities involved during those MSW incubations have been identified. It appears that strict hydrogenotrophic archaea from the Methanomicrobiales order are highly dominant in thermophilic condition which is in accordance with a SAO reaction implication.

[1] Conrad (1999) *FEMS Microbiol Ecol* **28**, 193–202.