Geochemistry and mineralogical composition of the airborne particles of sand dunes and dust storms settled in Iraq and their environmental impact

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Introduction

Five dust storms that are blown in 2008 and sand dunes disseminated in the Western Desert of Iraq are sampled. This work is going to discuss the origin of dust that blow on Iraq, and their environmental impacts.

Results

The enrichment of SiO_2/Al_2O_3 by mechanical and chemical processes produces quartz arenites (Orthoquartzites) [1]. Heavy minerals in dust storm and sand dunes formed 2.3% and 6.6% respectively. Clay appears to be domennanted (Figure 1).

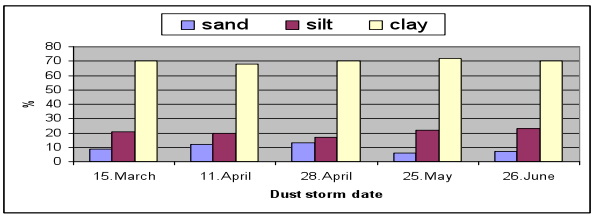

Figure 1: Average distribution of grain sizes in dust storm samples.

Conclusions

The Sahara of North Africa, lands in Saudi Arabia going to desertification. They provided 7 million tons of clayey dust during 8 dipping temperature 6ºC.

[1] Obiefuna, G.I. and Orazulike, D.M (2011) *Research Journal of Environmental and Earth Sciences* **3**(2): 95-102.

Reduction of carbon tetrachloride by organo-green rust

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Layered Fe^{II}–Fe^{III} hydroxide salts (green rusts, GR) are redox reactive materials that are formed in anoxic soils and sediments and when iron corrodes. GRs are powerful reductants of environmental pollutants [1, 2]. GR intercalated with surfactants (organo-GR) is a new type of reactive hydrophobic material that has been recently synthesized in laboratory scale [3]. Due to the presence of structural Fe^{II} and a hydrophobic interlayer, organo-GRs are expected to react preferentially with non polar contaminants. Hence, the reductive properties of the novel organo-GRs were examinated against carbon tetrachloride (CT).

In the present work, we demonstrate that organo-GR can directly reduce carbon tetrachloride into less harmful non-chlorinated compounds (*in casu* carbon monoxide and formate). Chloroform (CF) was also formed as a minor end product (< 5%). Reduction of CT with other iron (hydr)oxides than GR formed mainly chloroform and other less chlorinated compounds [4]. The formation of less chlorinated compounds proceeds via hydrogen abstraction of trichloromethyl radicals ($\bullet CCl_3$) and/or protonation of the trichloromethyl carbanion ($:CCl_3^-$) following the hydrogenolysis pathway. The hydrophobic interlayer of organo-GRs may stabilize both the radical and the carbanion, sheltering them from proton donors and directing the reactions towards the formation of carbon monoxide and formate. Analyses of chloride in the reactions confirm the complete dechlorination of CT. These findings suggest that organo-GRs are promising reactants for remediation of groundwater and soil contaminated by chlorinated solvents.

[1] Hansen *et al*. (1996) *Environ. Sci. Technol*. **30**, 2053-2056. [2] Erbs *et al*. (1999) *Environ. Sci. Technol*. **33**, 307-311. [3] Ayala-Luis *et al*. (2010) *Appl. Clay Sci*. **50**, 512-519. [4] Mccormick *et al*. (2004) *Environ. Sci. Technol*. **38**, 1045-1053.