# Potentiality and limits of applying DSC and TG to complex systems: Direct and indirect information

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The relationships between agriculture and environmental quality find a key issue in the study of the processes enhancing organic matter stability in soil, in order to increase C sink and mitigate the effects of global change. Various and different approaches are possible, due to the complexity and heterogeneity of the soil system where SOM chemical composition and its architecture are widely interdependent within the soil matrix. In recent years the application of thermal analysis to the study of soil organic matter has found a renewed interest, mainly due to the possibility to obtain quantitative estimation of organic matter within the soil mineral matrix, possibly without chemical extraction. In addition, the dynamic measure conditions obtained through the thermal scans give the theoretical possibility to deduce the kinetics of the thermally induced processes. Different patterns of thermal stability are shown by different biomasses, compost or soils. However, it could be misleading to assimilate the time based output of DSC and TG measures to the kinetics of the processes occurring in soil, thus the concepts of organic matter stability or lability or recalcitrance needs to be better defined according to appropriate definition of the reference context.

In the presentation, the comparison between information obtainable from compost or soil analysis will help us to highlight potentiality and limits in applying DSC and TG to complex systems in order to move from a qualitative approach to a better definition of thermal and biochemical stability indexes. Finally, an open question should be discussed: can we forecast or imagine to include information on thermal behaviour of SOM within an ecological approach to the soil system?

# Sorption of metals on a novel synthesized Mn (oxy)hydroxide

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**Novel synthetic manganese (oxy)hydroxide**

A novel synthetic manganese (oxy)hydroxide is synthetized using the modified protocol of Ching *et al*. [1], wich is commonly used for the preparation of birnessite. This (oxy)hydroxide is studied as a possible chemical stabilizing agent for metals in contaminated soils. Its stability in deionized water and the sorption of Cu and Pb are studied.

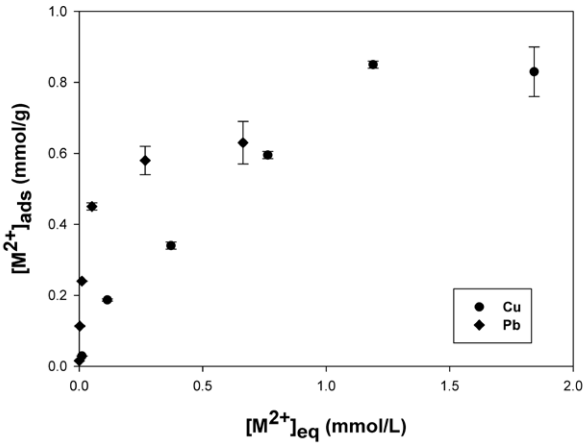


**Figure 1:** Adsorption isotherms of Cu and Pb on the Mn (oxy)hydroxide at pH 4

**Results**

The dissolution of the Mn (oxy)hydroxide in water reaches 12 and 1 mmol/g for solid/liquid ratios of 1/500 and 1/10, respectively and indicates that the phase could be fairly stable in soils. The Langmuir isotherm parameters calculated show that the maximum adsorbed quantity of Cu and Pb reach 1.3 and 0.6 mmol/g. The sorption parameters of the Mn (oxy)hydroxide were compared to those of birnessite at pH 4, which reached 1.1 and 1.4 mmol/g for Cu and Pb, respectively. Birnessite thus adsorb better Pb than the synthesized phase, but for praticial use as a chemical stabilizant, our Mn (oxy)hydroxide could be promising due to its easy synthetisation.

[1] Ching *et al*. (1997) *Inorg. Chem*. **36,** 883-890.