Os isotopes in detrital Os alloys from the Rhine and evidence for a 1.2-1.3 Ga global? mantle melting event

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Osmium isotope 'dating' of large populations of mantle-derived osmium-bearing alloys provides a key test for the idea of episodic crustal growth linked to global mantle melting events in Earth history [1]. Os alloys are formed within the mantle during high-degree melting, and their $^{187}Os/^{188}Os$ isotopic ratio can be used to date their formation.

Over 200 detrital Os alloys from placer gold occurrences in the Rhine between Basel and Frankfurt were obtained by gold washing techniques and hand-picking from gold separates. These 20-300 μm detrital Os alloys are derived from outcrops of ultramafic rocks in the Alps, which include blocks of mantle rocks with Tethyan affinity such as the Totalp Massif, and ultramafic lenses of unknown (Precambrian?) age in the Gotthard and Aar Massifs. Another source may be the Molasse of the Alpine foreland basin. $^{187}Os/^{188}Os$ isotope ratios were measured by LA-MC-ICPMS, to determine Re-depletion ages that should constrain the ages of melting in the mantle source rocks. The data show distinct age peaks at 0.5 and 1.2-1.3 Ga.

The 1.2-1.3 Mesoproterozoic age peak recorded by the Rhine Os alloy population does also occur in Os alloy age distributions of other ophiolites worldwide, generally as a subsidiary peak [1]. We show that the Mesoproterozoic age is also prevalent in Re-depletion age distributions of whole rock samples of refractory mantle xenoliths from ocean islands, and whole-rock samples of anomalously depleted abyssal peridotites from modern oceans, *e.g.*, from the 15-20 Fracture Zone (MAR) and Macquarie Island [2]. Therefore, analysis of Re-depletion ages from mantle rocks worldwide collectively point to a Mesoproterozoic, 1.2-1.3 Ga high-degree mantle melting event of global significance. This event may be related to a slab-avalanche or whole-mantle overturn event in Mesoproterozoic times.

[1] Pearson *et al*. (2007) *Nature* **449**, 202-205. [2] Dijkstra *et al*. (2010) *J. Petrology* **51**, 469-493

Adsorption of a textile dye (Acid Red 88) by montmorillonitic clay: Estimation of equilibrium, kinetic and thermodynamic parameters

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Introduction

Textile dyes are one group of the pollutants and the presence of dyes in the aquatic environment has been of great concern because of their potential health hazards associated with the carcinogenic, mutagenic, allergenic and toxic natures as well as negatively effects on the photosynthetic activity in aquatic life [1].

Method

The adsorption of AR88 onto montmorillonite was studied with variation in the parameters of pH, contact time, adsorbent and dye concentrations, and temperature to estimate the equilibrium, kinetic parameters and thermodynamic [2].

Kinetic models including pseudo-second-order, pseudo-nth-order, Bangham and double-exponential models were selected to follow the adsorption process. Kinetic parameters such as the rate constants, the equilibrium adsorption capacities and the related correlation coefficients, for each kinetic model were calculated and discussed. Thermodynamic parameters such as activation energy (Ea), Gibbs free energy (ΔG^o), enthalpy (ΔH^o) and entropy (ΔS^o) were also evaluated.

Discussion of Results

The dynamic data were fitted well the pseudo-nth-order kinetic model and also followed double-exponential function, the pseudo-second-order and Bangham Model, respectively.

The adsorption data obtained were well described by the Langmuir isotherm model. The maximum adsorption capacity was found to be 588 mgg^{-1} from the Langmuir isotherm model at 20 ºC. The negative value of change in Gibbs free energy indicates that the adsorption is spontaneous. The results show that montmorillonitic clay could be employed as low-cost material for the removal of acid dyes from textile effluents.

[1] Akar *et al*., (2008) *Bioresource Tech*. **99**, 3057-3065. [2] Günay *et al*., (2007) *J. Hazard. Mater*.**146(1,2),** 362-371.