

Interfacial thermodynamics: Inherent limitations of classical adsorption theories

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Equilibrium adsorption properties defined by macroscopic parameters of adsorption densities (mol/m^2) are inherently ambiguous and do not obey conventional thermodynamic adsorption theories, because the energy states for different microscopic metastable-equilibrium adsorption (MEA) modes that construct real equilibrium state cannot be described by the macroscopic methodology such as adsorption density [1-2]. An initial concentration (C_0) effect, i.e. the dependence of equilibrium adsorption isotherms on the initial adsorbate concentration, was first found to be a fundamental macroscopic adsorption phenomenon [3-5]. A multi-batch adsorption experiment was designed to test this phenomenon in arsenate- TiO_2 system. Under the same thermodynamic conditions, when the initial adsorbate was added by multiple batches, adsorption isotherms declined as the multi-batch increased. Microscopic EXAFS analysis showed that at least two MEA states co-existed in the equilibrium samples: monodentate mononuclear (MM) and bidentate binuclear (BB) modes. The ratio of BB:MM increased as the multi-batch increased or as the C_0 decreased. Experimentally measured equilibrium isotherms/constants therefore fundamentally depend on the initial reactant concentrations (e.g. initial adsorbate concentration and/or adsorbent concentration) and kinetic pathways since the surface molecular structures of different MEA states are generally affected by the kinetic/dynamic processes [6-10]. Failure in recognizing this principle has greatly hindered our understanding and interpretation on many interfacial processes in earth, environmental, and engineering sciences.

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Studying on tectono-geochemistry and rock ore specimens appraisal of Bangwei copper mine

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Bangwei copper mine is located in the east of Wendong-Fubang folded bundle, the copper-bearing limonite-quartz vein penetrate north-south fracture and 50 meters width fractured zone which along the Huimin group of Lancang of Proterozoic. The Occurrence is $300 \angle 600$, The thickness of single vein is about 1meter, mineralized zone extend 3 kilometers spasmodically. Mineral is mainly copper-bearing limonite. The gangue is composed of quartz and sericite, with a Honeycomb structure. The spectrum of ore contains: Cu-7000ppm, As-600ppm, Y-100ppm. It can be determined that the background value of ore-forming element by the statistical analysis of obtained data. It shows that the content changes of element of Sn, W, Cu, Pb, Zn focus on the rock mass of Indosinian and fracture of metamorphic rock nearby. There is significantly positive correlation between the content of element.

This paper studies on tectono-geochemistry of Bangwei copper and rock ore specimens appraisal, the results of ICP-AES is that the higher copper content reach 350ppm, 198ppm, and doesn't discover copper metallic minerals in rock ore appraisal. Based on previous work this paper considers that the metallogenic province is Cu, Fe abnormal of mineralization.

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