

# A laboratory investigation of the mechanisms of molybdenum accumulation in the solid phase: The influence of organic molecules

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- The mechanisms for Mo precipitation in marine sediments is not well understood
  - *The role of organic molecules, which are present as aqueous species and bound to solid surfaces, has not been investigated.*
    - *Could organic molecules play a role in the accumulation of Mo in the solid phase?*
  - *Ultimately, this uncertainty hampers the utility of Mo as a useful tracer for past changes in organic carbon burial in marine sediments*
- What have we discovered?
  - *Aqueous phase interactions*
    - *MoO<sub>4</sub><sup>2-</sup> interacts with aromatic molecules that have two phenolic functional groups on adjacent ring carbons via hydrogen-bonding and/or covalent bonds*
    - *Mo:organic complex, with either catechol or 2-mercaptopropionic acid, is present as 1:2 complex as determined using UV/Vis and ES-MS*
  - *MoO<sub>4</sub><sup>2-</sup> adsorption to aluminum oxide and pyrite*
    - *Langmuir modeling of the Mo adsorption suggests a one-site adsorption surface with the adsorption equilibrium constants and the maximum adsorption capacities inversely proportional to the change in pH*
- Future research will focus on Mo-thiol interactions, both in the aqueous phase and with pyrite, to probe possible reactions under sulfidic conditions.