

Extract from a report for the International Molybdenum Association REACH Molybdenum Consortium on the Speciation of Molybdenum Compounds in Water, Ultraviolet Spectra and REACH Read-Across.

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Summary Extract

The speciation of an element, speciation, is the distribution of an element amongst chemical species defined by composition and structure. For REACH we need to know whether substances in a biological environment yield the same or different species; whether one substance is representative of a group of substances; whether we can apply data from one representative substance to other related substances, a procedure known as read-across.

For the purposes of REACH the molybdenum species produced in water when these substances are dissolved or stirred in suspension have been identified by ultraviolet spectroscopy of the water phase: sodium molybdate, $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$, ammonium dimolybdate, $(\text{NH}_4)_2\text{Mo}_2\text{O}_7$, ammonium heptamolybdate, $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$, ammonium octamolybdate, $(\text{NH}_4)_4\text{Mo}_8\text{O}_{26} \cdot 5\text{H}_2\text{O}$, calcium molybdate, CaMoO_4 , molybdenum metal powder, ferromolybdenum, molybdenum dioxide, MoO_2 , molybdenum trioxide, MoO_3 , roasted molybdenum concentrate (MoO_3), and molybdenum disulfide, MoS_2 . Species were identified by their characteristic uv spectra, peak positions and intensities. The spectra were analysed by decomposition into Gaussian peaks.

The uv spectral analysis has enabled us to describe the speciation in water solutions of soluble molybdates (sodium and ammonium molybdates) and in supernatant solutions of suspensions of poorly soluble molybdenum substances (calcium molybdate, molybdenum metal, ferromolybdenum, molybdenum dioxide, molybdenum trioxide, roasted molybdenum concentrate and molybdenum disulfide). The solutions and supernatant liquids contain the molybdate ion and, in addition at lower pHs, protonated molybdate. **At biological concentrations and pH the only molybdenum species produced from the molybdenum substances studied is the molybdate, $[\text{MoO}_4]^{2-}$, ion. Read across from sodium molybdate is therefore justified.**

(Note: Data from the full report will be incorporated into the REACH technical dossier for each MoCon substance).