

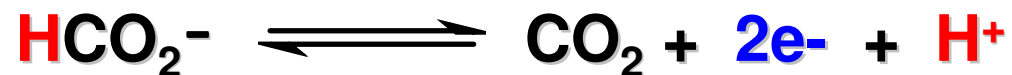
**Molybdenum and tungsten-containing
formate dehydrogenases:
aiming to inspire a catalyst
for carbon dioxide utilisation**

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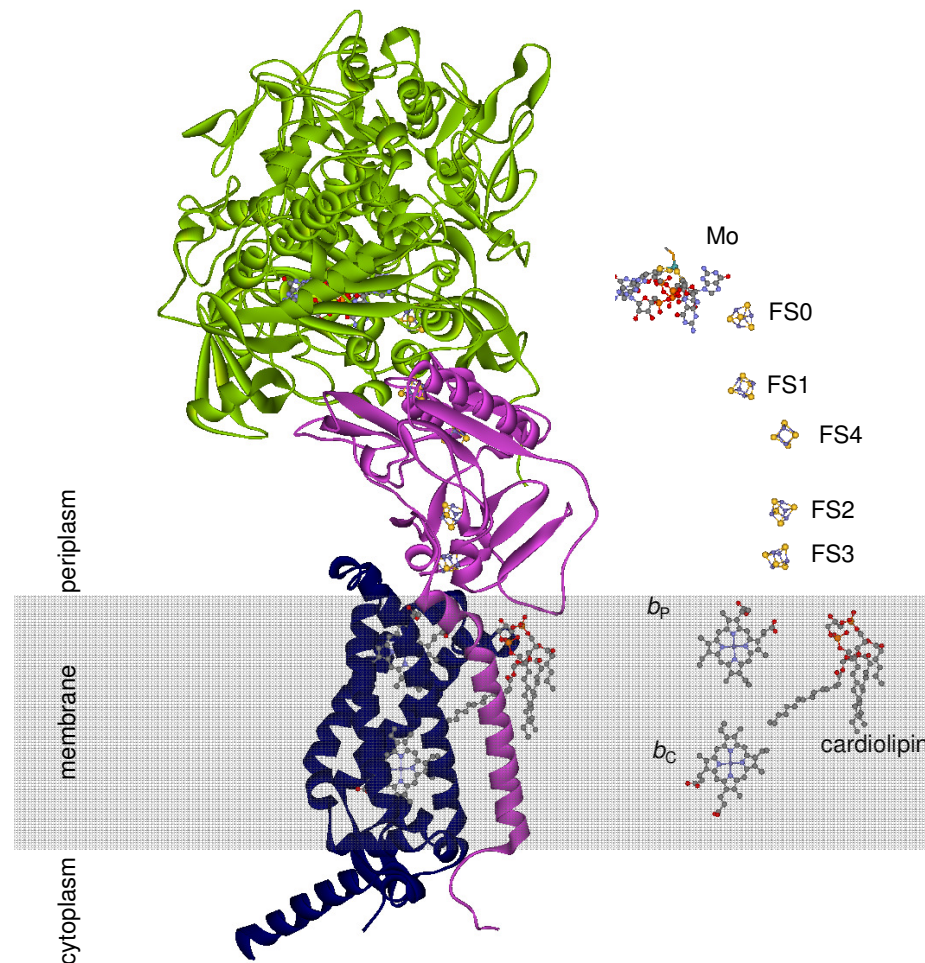
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Formate dehydrogenases



$$E^{\circ'} (\text{CO}_2/\text{HCOO}^- \text{ (pH 7, formate 1 molal activity, CO}_2 \text{ (g) 1 atm)}) = -0.43 \text{ V}$$



Maia *et al.*, ICA, 2016, DOI 10.1016/j.ica.2016.07.010

Maia *et al.*, JBIC, 2015, DOI 10.1007/s00775-014-1218-2

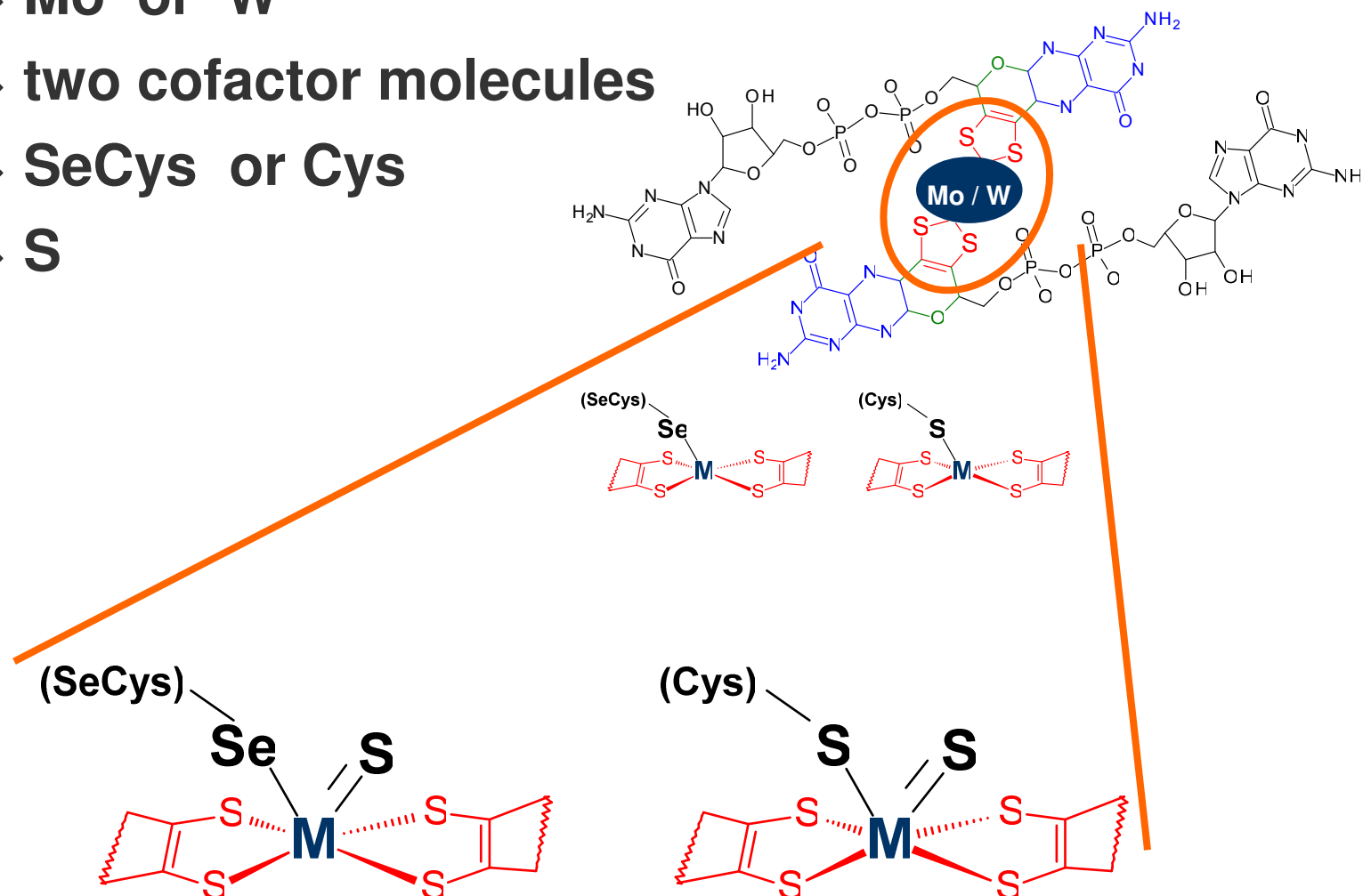
Formate dehydrogenases

Active site: $\text{HCO}_2^- \rightleftharpoons \text{CO}_2$

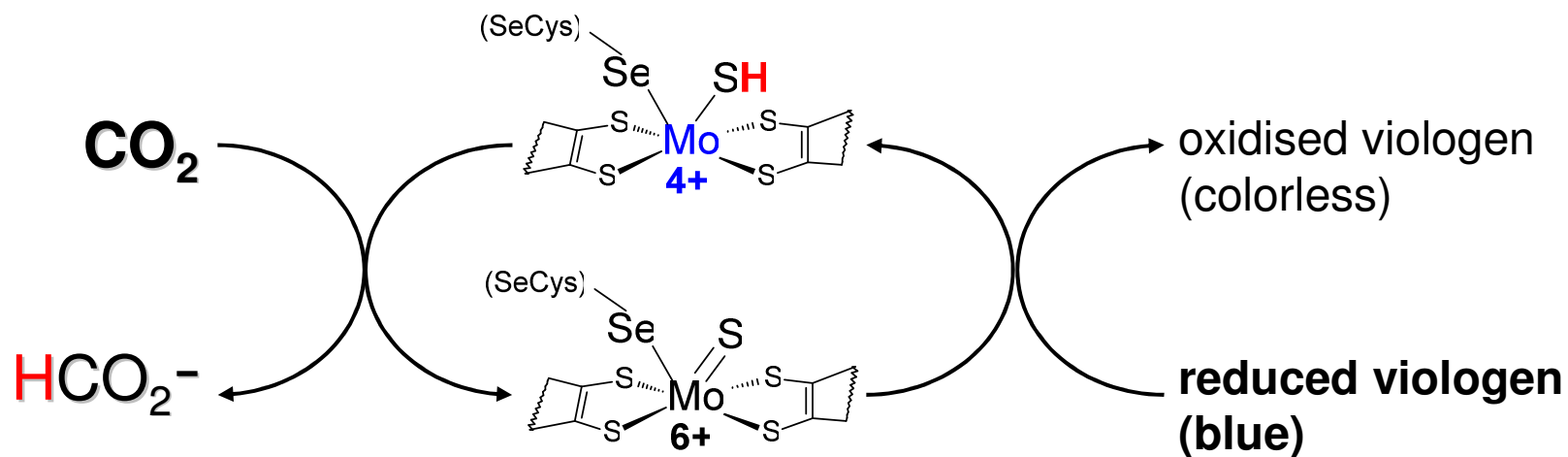
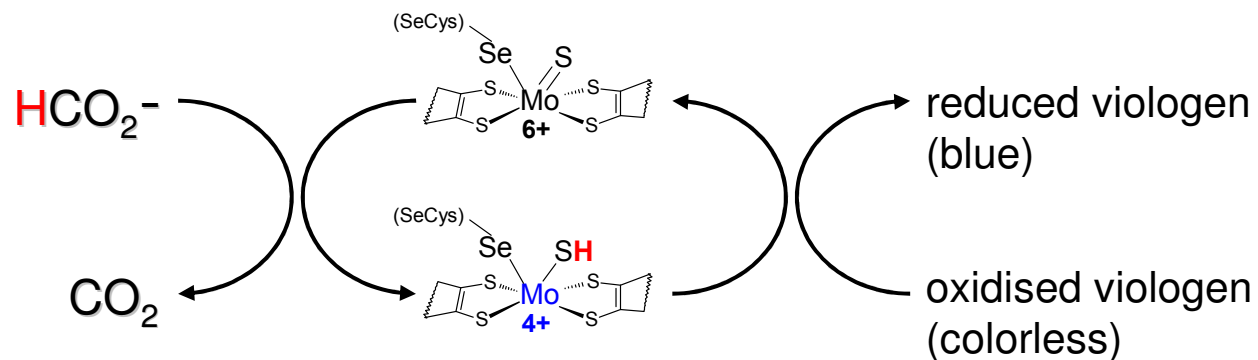
 **Mo or W**

 **two cofactor molecules**

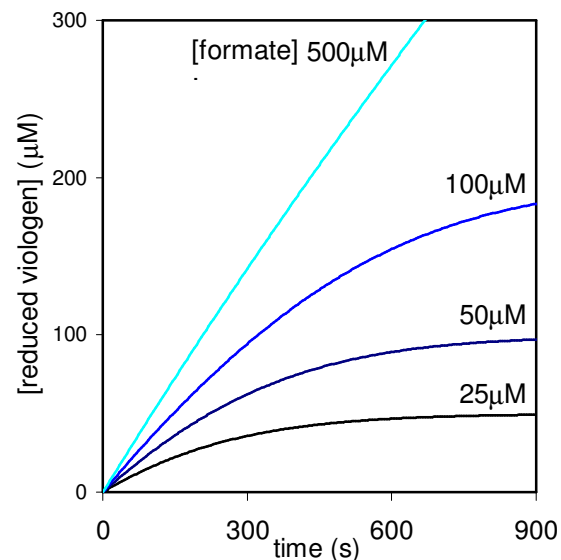
↘ **SeCys or Cys**

 S

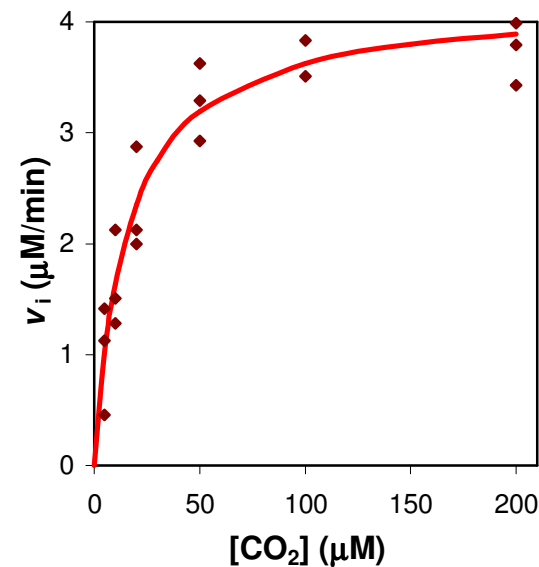
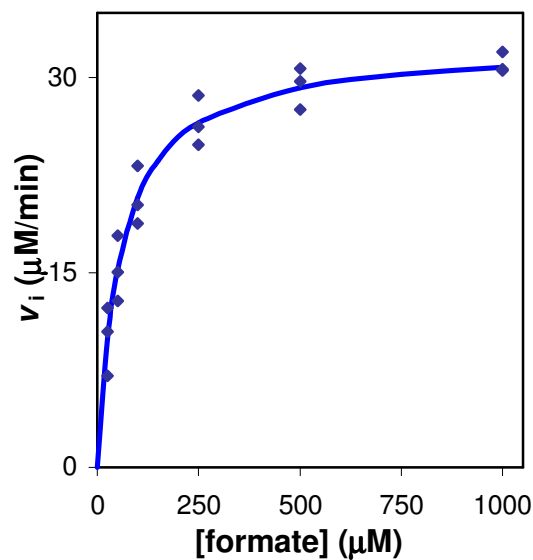
Kinetics



Kinetics



Desulfovibrio desulfuricans



	K_m^{app} (μM)	$k_{\text{cat}}^{\text{app}}$ (s^{-1})	k^{app} ($\text{M}^{-1}\text{s}^{-1}$)
HCO_2^-	57.1	543	9.51
CO_2	15.7	46.6	2.97

Mo and W-containing formate dehydrogenases: aiming to inspire a catalyst for carbon dioxide utilization

" thermodynamically difficult reaction "



formate dehydrogenases

or synthetic catalysts inspired on their chemical features

may be a valid approach

to convert the atmospheric carbon dioxide into formate

Maia *et al.*, JACS, 2016, DOI 10.1021/jacs.6b03941

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