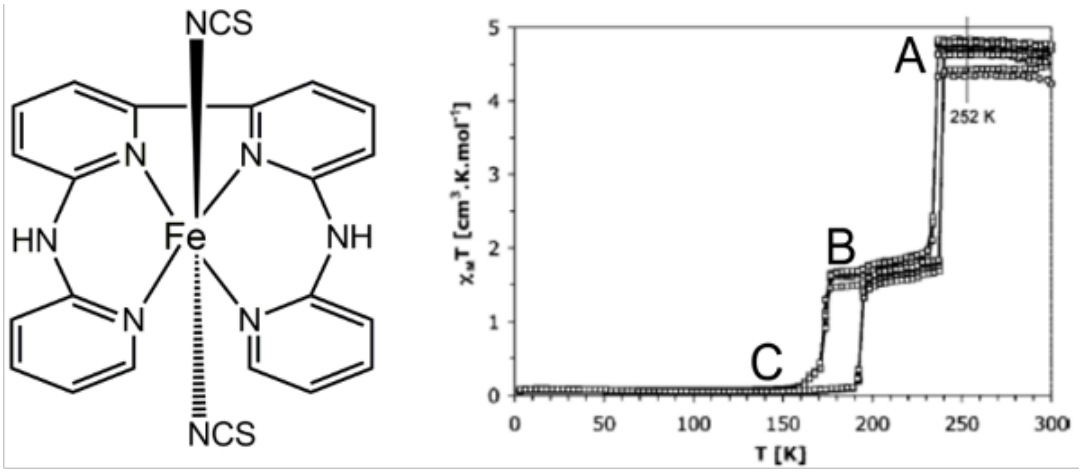
1. The following complexes have the indicated effective magnetic moments. Describe the structure and bonding of the complexes on the basis of the μ_{eff} values (in B.M.).

(a) K_2NiF_6 (μ_{eff} = 0 B.M.)
(b) $Ni(NH_3)_2Cl_2$ (μ_{eff} = 3.3 B.M.)
(c) $Ni(PEt_3)_2Cl_2$ (μ_{eff} = 0.0 B.M.)
(d) $Ni(Ph_3AsO)_2Cl_2$ (μ_{eff} = 3.95 B.M.)

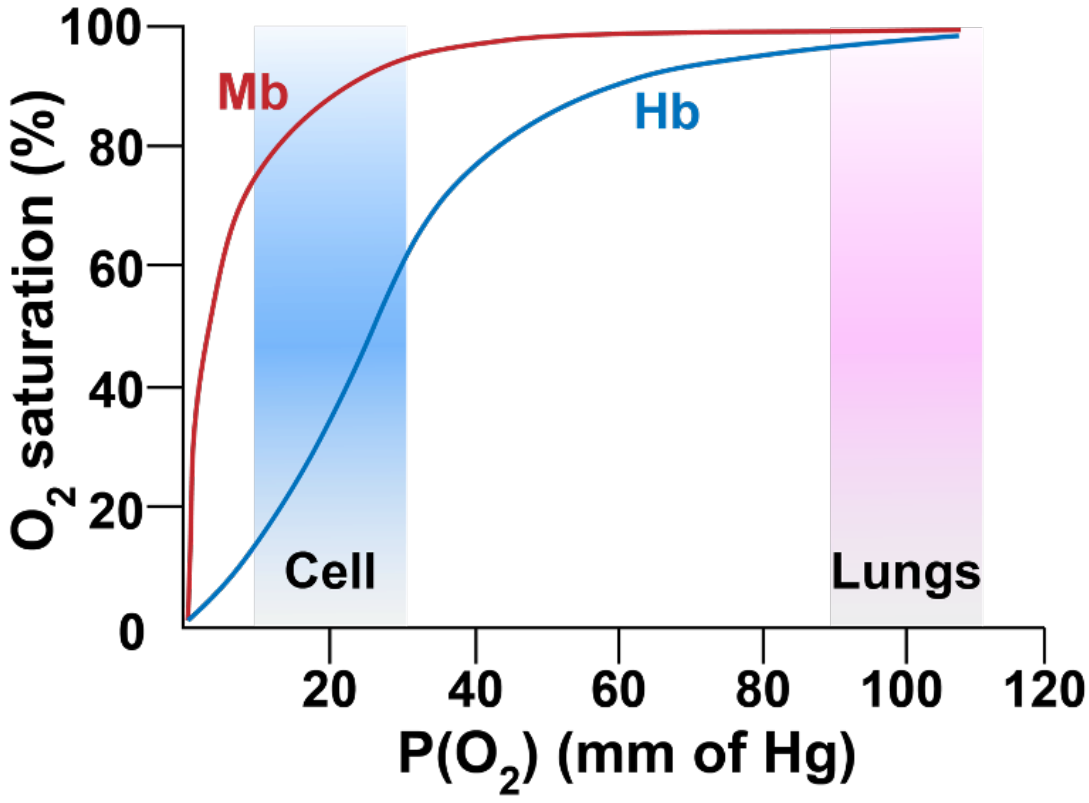
2. For the following octahedral iron complex, the effective magnetic moment (magnetic susceptibility) changes at 300 K (A, μ_{eff} = 6.18 BM, c_MT = 4.8 cm^3 K mol^{-1}), 240 K (B, μ_{eff} = 3.45 BM, c_MT = 1.5 cm^3 K mol^{-1}) and 150 K (C, μ_{eff} = 0 BM, c_MT = 0 cm^3 K mol^{-1}). Write the electronic configuration of the iron ion in the complex at step A and step C?



3. For spin crossover systems, in the liquid state it is common to observe a gradual transition from low spin to high spin as a function of temperature. In the solid state, however, there is often an abrupt change in spin state at a certain temperature. Explain this difference and rationalize.

4. Why is the O_2-binding curve sigmoidal for hemoglobin; however, it is hyperbolic for myoglobin?

Ans.



Cooperative effect in Hb. Interaction between different subunits via salt bridge interactions to showcase the sigmoidal behavior.

Whereas in Mb, one single unit. No cooperativity effect. So hyperbolic behavior.