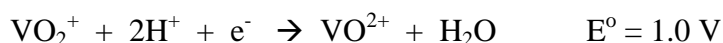


NPTEL Inorganic chemistry of life – Principles and perspectives

Week 5 - Assignment 5

W5_01. The ^{51}V NMR is well suited for identifying the its primary coordination sphere. What oxidation state is suited for this? What & how the primary coordination sphere is identified. Shine light on these aspects.

W5_02. Given the two redox reactions,



Answer the following. (i) Identify the couple in (a) and also in (b). (ii) Compare both and tell which one of these redox couples is more favoured and why?

W5_03. During the superoxide dismutase activity of manganese enzyme, what type of oxidation state changes occur & why?

W5_04. At photosystem II, the two water molecules are converted to O_2 by the fourth manganese (i.e., the Mn that is located outside the cubane structure) and Ca^{2+} . If that were the case why should there be a tetra-manganese cluster. Give your reasons and then explain this in the context of the functioning of this enzyme at each pulse of the light.

W5_05. You have learned that the globin protein (in haemoglobin, Hb& myoglobin, Mb) prevents the formation of μ -oxo dimer. What is this μ -oxo dimer, how is it formed, how does the globin protein prevent its formation and what would be the end result if not prevented.

W5_06. Assuming that the O_2 stretching frequencies of free and bound to hemoglobin, hemerythrin and hemocyanin are ~ 1400 , ~ 1150 , ~ 850 and $\sim 750 \text{ cm}^{-1}$ respectively, comment on the nature of O_2 binding to these proteins and substantiate your answer accordingly