MEGA LECTURE

Topic 15 Exercise 4 – variable oxidation states and catalysis

1. Describe what happens when a solution of ammonium vanadate (V) is acidified and then treated with zinc and account for all your observations:

2. a) Write an equation for a reaction catalysed by the following substances and explain why they are important:

   i) V_2O_5
   ii) Fe
   iii) Rh

   b) Explain how heterogeneous catalysts work and how they can be poisoned

   c) Explain why a ceramic support is used for Rh in catalytic converters

3. Explain how the following reaction can be catalysed by both Fe^{2+} and Fe^{3+} ions:
   $S_2O_8^{2-}(aq) + 2I^-(aq) \rightarrow 2SO_4^{2-}(aq) + I_2(aq)$
   For each ion, write two equations to show the catalysed pathway and explain why both are faster than the uncatalysed reaction.

4. a) Write an equation for the reaction which occurs during the titration between ethanedioate ions ($C_2O_4^{2-}$) and MnO_4^-.

   b) Explain why the reaction is slow initially but quite fast close to the end-point.

5. Write the equation for the reaction taking place when ethanal reacts with Tollen's reagent.