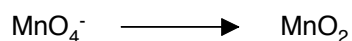## REDOX EQUATIONS under alkaline conditions

1. This question is about the reaction between iodide ions and manganate(VII) ions in alkaline solution. It doesn't matter at all if you have never come across this reaction before.

    The manganate(VII) ions, MnO_4^-, oxidise the iodide ions, I^-, to iodine, I_2. In the process, manganate(VII) ions are reduced to a precipitate of manganese(IV) oxide, MnO_2.

    a) Work out the electron-half-equation for the conversion of iodide ions into iodine.

    b) Start with the following change, and produce the electron-half-equation which would apply if the reaction was done under acidic conditions.

$$MnO_4^- \longrightarrow MnO_2$$

    c) Now convert this to alkaline conditions by adding enough hydroxide ions to each side to neutralise all the hydrogen ions present producing water molecules. Remember to simplify the equation by looking for water molecules which appear on both sides of your equation.

    d) Finally, combine this with your equation in part (a) to give the ionic equation for the reaction.

2. At some point during your course, you will almost certainly meet the silver mirror test for an aldehyde in organic chemistry. In this question, I am asking you to work out a proper equation for it, without any guidance. Just use the techniques you have practised up to now.

    Aldehydes have a general formula RCHO, where R can be a hydrogen atom or a hydrocarbon group. When an aldehyde is reacted with an alkaline solution containing the complex silver ion, $Ag(NH_3)_2^+$, it is oxidised to a carboxylate ion, $RCOO^-$. (Don't worry about the names – all you are interested in for now are the formulae.)

    In the process, the silver ion is reduced to silver metal, Ag, and the ammonia is released as simple NH_3. The silver coats the inside of the test tube to give it a mirror-like appearance.

    Work out the ionic equation for the reaction. Remember that it is done under alkaline conditions.