Electrochemistry

Question 1

Calculate the standard cell voltages and write the overall chemical reactions for cells which consist of the following half-cells

(a) Cr^{3+}/Cr and Ag^{+}/Ag

(b) Mg^{2+}/Mg and Cu^{2+}/Cu

(c) Fe^{3+}/Fe^{2+} and $Cr_2O_7^{2-}/Cr^{3+}$ ($Cr_2O_7^{2-}$ is acidified)

Question 2

Predict whether the following reactions could occur under standard conditions:

(a) $Sn^{4+} + H_2O_2 \rightarrow Sn^{2+} + 2H^{+} + O_2$

(b) $Cu + 2H^+ \rightarrow Cu^{2+} + H_2$

Question 3

Which of the following species could react with 1 mol L^{-1} HCl to form hydrogen gas?

(a) Mg

(b) Ag

(c) Zn

Question 4

From the table of reduction potentials supplied, identify

(a) an oxidising agent which could convert Cl^- to Cl_2, but not F^- to F_2.

(b) an oxidant which could convert **Ag to Ag^+**, but not Hg to Hg^{2+}.

Question 5

Predict whether the following disproportionation reactions could occur in aqueous solution:

(a) Iron(II) ion to iron(III) ion and iron metal

(b) chlorine to hypochlorous acid and chloride ion

Question 6

Predict whether reactions could occur in each of the following. Assume standard conditions.

(a) Iron(II) nitrate is mixed with sodium iodide.

(b) An iron nail is placed in a tin(II) chloride solution.

(c) Hydrogen sulfide is bubbled through an acidified potassium dichromate solution.

(d) Chlorine gas is bubbled through an acidified solution of iron(II) bromide.