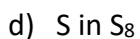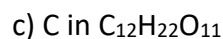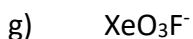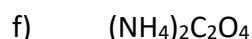# G12 Chemistry: Class 15 Homework

1. Determine the oxidation number of the specified number of the specific element in each of the following. **[6 marks]**

    a) N in NF_3

    b) Cr in CrO_4^{2-}

    c) C in $C_{12}H_{22}O_{11}$

    d) S in S_8

    e) P in P_2O_5

    f) C in $CHCl_3$

2. Determine the oxidation number of each element in each of the following. **[9 marks]**

    a) H_2SO_3

    b) OH^-

    c) HPO_4^{2-}

    d) AsO_3^{3-}

    e) $S_4O_6^{2-}$

    f) $(NH_4)_2C_2O_4$

    g) XeO_3F^-
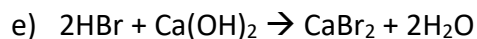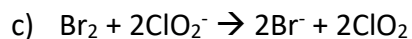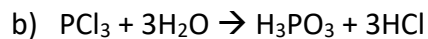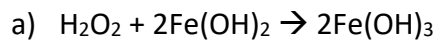
    h) BaH_2

    i) $LiNO_2$

3. As stated in rule 4, oxygen does not always have its usual oxidation number of -2. Determine the oxidation number of oxygen in each of the following. **[2 marks]**

    a. The compound OF_2

    b. The peroxide ion O_2^{2-}

4. Determine the oxidation number of each element in each of the following ionic compounds by considering the ions separately. Hint: one formula unit of the compound in part (c) contains two identical monatomic ions and one polyatomic ion. **[3 marks]**

    a) $Al(HCO_3)_3$

   b) $(NH_4)_3PO_4$

    c) $K_2H_3IO_6$
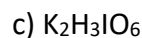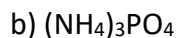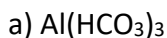
5. Determine whether each reaction is a redox reaction. For redox reactions, identify the oxidizing agent and the reducing agent. **[7 marks]**

    a) $H_2O_2 + 2Fe(OH)_2 \rightarrow 2Fe(OH)_3$

    b) $PCl_3 + 3H_2O \rightarrow H_3PO_3 + 3HCl$

    c) $Br_2 + 2ClO_2^- \rightarrow 2Br^- + 2ClO_2$

    d) $2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$

    e) $2HBr + Ca(OH)_2 \rightarrow CaBr_2 + 2H_2O$

6. Balance each of the following half-reactions under acidic conditions. **[3 marks]**

    a) $ClO_3^- \rightarrow Cl^-$

    b) $NO \rightarrow NO_3^-$

    c) $O_2 \rightarrow H_2O_2$
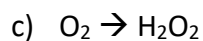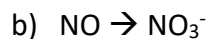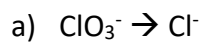
7. Balance each of the following half-reactions under basic conditions. **[3 marks]**

   a) $MnO_4^- \rightarrow MnO_2$

   b) $CN^- \rightarrow CNO^-$

   c) $CO_3^{2-} \rightarrow C_2O_4^{2-}$
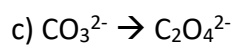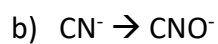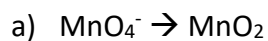
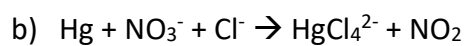8. Balance each of the following ionic equations for acidic conditions. Identify the oxidizing agent and the reducing agent in each case. **[6 marks]**

   a) $MnO_4^- + Ag \rightarrow Mn^{2+} + Ag^+$

   b) $Hg + NO_3^- + Cl^- \rightarrow HgCl_4^{2-} + NO_2$
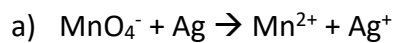
9. Balance the following ionic equations for basic conditions. Identify the oxidizing agent and the reducing agent in each case. **[6 marks]**

    a) $CN^- + MnO_4^- \rightarrow CNO^- + MnO_2$

    b) $ClO^- + CrO_2^- \rightarrow CrO_4^{2-} + Cl_2$
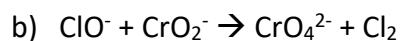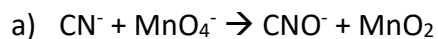
10. Use the oxidation-number method to balance the following equations. **[5 marks]**

    a) $S^{2-}(aq) + I_2(s) \rightarrow SO_4^{2-}(aq) + I^-(aq)$ (basic solution)

    b) $IO_3^-(aq) + HSO_3^-(aq) \rightarrow SO_4^{2-}(aq) + I_2(s)$ (acidic solution)