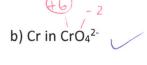
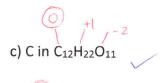
G12 Chemistry: Class 15 Homework

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



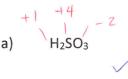


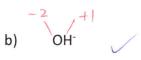


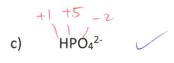


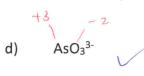


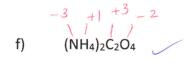
2. Determine the oxidation number of each element in each of the following. [9 marks]



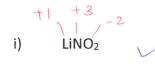












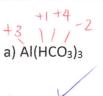
- 3. As stated in rule 4, oxygen does not always have its usual oxidation number of -2. Determine the oxidation number of oxygen in each of the following. [2 marks]
 - a. The compound OF₂

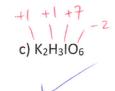


b. The peroxide ion O₂²-



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]





Determine whether each reaction is a redox reaction. For redox reactions, identify the oxidizing agent and the reducing agent. [7 marks]

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

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 $H_2O_2 + 2Fe(OH)_2 \rightarrow 2Fe(OH)_3$
 $H_2O_2 = 0xidizing agent$
 $Fe(OH)_2 = reducing agent$

b)
$$PCI_3 + 3H_2O \rightarrow H_3PO_3 + 3HCI$$

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

reduction

 $Br_2 = 0$ xidizing agent

 $Clb_- = mduciny$ agent

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

+1 +1 +4 -2 +1 -2 +4 -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 $Cl^ be^-$ + bH + + ClO_3 \rightarrow Cl^- + $3H$ 20

b) NO
$$\rightarrow$$
 NO₃

c)
$$O_2 \rightarrow H_2O_2$$

$$2e^- + 2H^+ + O_2 \rightarrow H_2O_2$$

7. Balance each of the following half-reactions under basic conditions. [3 marks]

a)
$$MnO_4 \rightarrow MnO_2$$
 2 Hrs
 $4DH^- + 4H^+ + MnD_4^- \rightarrow MnD_2 + 2Hro + 4DH^-$
 $3e^- + 2Hro + MnD_4^- \rightarrow MnD_2 + 4DH^-$

b)
$$CN^{-} \rightarrow CN0^{-}$$

 $20H^{-} + 1400 + CN^{-} \rightarrow CN0^{-} + 2H^{+} + 20H^{-} 1410$
 $20H^{-} + CN^{-} \rightarrow CN0^{-} + 1420 + 2e^{-}$

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

$$\frac{\text{oxidation}}{\text{(Ag} \rightarrow \text{Ag}^{+} + e^{-})} \times 5.$$

$$\frac{\text{reduction}}{\text{SH}+ + \text{MnO4}^{-}} \rightarrow \text{Mn}^{2+} + 4 \text{Hzo}$$

$$A = \text{MnO4}^{-} \text{PA} = \text{Ag},$$

b)
$$Hg + NO_3^- + Cl^- \rightarrow HgCl_4^{2-} + NO_2$$

$$\frac{\text{ation}}{(Ag \rightarrow Ag^{\dagger} + e^{-})} \times 5.$$

$$\frac{\text{SH+} + Mnv_{4}^{-} + 5Ag \rightarrow 5Ag^{\dagger} + Mn^{2}}{4 \text{ Hzc}}$$

$$\frac{\text{Ation}}{(Ag \rightarrow Ag^{\dagger} + e^{-})} \times 5.$$

$$\frac{\text{Ation}}{(Ag \rightarrow Ag^{\dagger} + e^{-})} \times 5.$$

$$\frac{\text{Add } - Mnv_{4}^{-}}{(Ag \rightarrow Ag^{\dagger} + e^{-})} \times 5.$$

$$\frac{\text{oxidahim}}{4\text{Cl}^{-} + \text{Hg}} \longrightarrow \text{HgCl4}^{2-} + 2e^{-}$$

$$\frac{\text{nduchim}}{\text{e}^{-} + 2\text{H}^{+} + \text{NO}_{3}^{-}} \longrightarrow \text{NO}_{2} + \text{Hvo}) \times 2$$

$$e^{-} \times 2\text{H}^{+} + \text{NO}_{3}^{-} \longrightarrow \text{NO}_{2} + \text{Hvo}) \times 2$$

$$e^{-} \times 2\text{H}^{+} + \text{NO}_{3}^{-} \longrightarrow \text{NO}_{2} + \text{Hvo}) \times 2$$

$$e^{-} \times 2\text{H}^{-} + \text{Hg} \longrightarrow \text{NO}_{3}^{-} \longrightarrow \text{NO}_{2}^{-} + \text{Hvo}$$

$$4CI^{-} + Hg + 4H^{+} + 2MO_{3}^{-} \rightarrow HgCl_{4}^{2^{-}} + 2MO_{2}^{-} + 2Hro$$

$$0A = M_{3}^{-}$$

$$RA = Hg$$

9. Balance the following ionic equations for basic conditions. Identify the oxidizing agent and the reducing agent in each case. [6 marks]

a)
$$CN^{-} + MnO_{4}^{-} \rightarrow CNO^{-} + MnO_{2}$$

$$\begin{array}{c} b.0H^{-} + 3CN^{-} + 4H20 + 2Mn0_{4} \\ \longrightarrow \\ 3 CND^{-} + 3H20 + 2Mn0_{2} + 4OH^{-} \\ \downarrow \\ 3CN^{-} + H20 + 2Mn0_{4} - \longrightarrow \\ 3 CNO^{-} + 2Mn0_{2} + 2OH^{-} \end{array}$$

b)
$$ClO^{-} + CrO_{2}^{-} \rightarrow CrO_{4}^{2-} + Cl_{2}$$

$$2 \text{ Cro}_2^- + 2 \text{ Hzo} + 6 \text{ Clo}^- \rightarrow 3 \text{ Cl}_2 + 12 \text{ DH}^- + 2 \text{ Cro}_4^2 + 4 \text{ Hzo}$$

 $2 \text{ Cro}_2^- + 2 \text{ Hzo} + 6 \text{ Clo}^- \rightarrow 3 \text{ Cl}_2 + 40 \text{ H}^- + 2 \text{ Cro}_4^2 -$

10. Use the oxidation-number method to balance the following equations. [5 marks]

a)
$$S^{2-}(aq) + I_{2}(s) \rightarrow SO_{4}^{2-}(aq) + .I^{-1}$$
 (basic solution)
 $(+8)$ $(+8)$ $SO_{4}^{2-} + 4I_{2} \rightarrow SO_{4}^{2-} + 8I^{-1} + 8H^{+} + 8DH^{-}$

$$80H^{-} + 4I_{2} \rightarrow 50_{4}^{2-} + 8I^{-1} + 8H^{+} + 8UH^{-}$$

$$80H^{-} + 5^{2-} + 4I_{2} \rightarrow 50_{4}^{2-} + 8I^{-} + 4H_{20}$$

$$+5^{-2} + 14_{-2} + 1$$

$$O_{3}^{-2}(aq) + HSO_{3}^{-1}(aq) \rightarrow SO_{4}^{2-}(aq) + I_{2}(s)$$
 (acidic solution

$$2H^{+} + 2IO_{3}^{-} + 5HSO_{3}^{-} \rightarrow 5SO_{4}^{2-} + I_{2} + Hro + SH^{+}$$

 $2IO_{3}^{-} + 5HSO_{3}^{-} \rightarrow 5SO_{4}^{2-} + I_{2}^{2} + Hro + 3H^{+}$