Practice Sheet: Balancing Redox Reactions

1. Indicate the oxidation number of the **bold-*italicized*** element in the following compounds:
   a. ***C***O
   b. ***C***O_2
   c. ***I***F_7
   d. Li_3***N***
   e. K_2***S***
   f. ***Sn***Cl_4
   g. Ba***S***O_4
   h. ***O***F_2
   i. Ca(***N***$O_3)_2$
   j. ***Fe***$_2O_3$
   k. H***Cl***O
   l. H***Cl***O_3

2. Indicate the oxidation number of the italicized element in the following ions:
   a. ***P***O_4^{3-}
   b. ***B***O_3^{3-}
   c. ***Zr***I_3^-
   d. ***I***O_3^-
   e. ***As***O_3^{3-}
   f. H***C***O_3^-
   g. ***N***H_4^+
   h. ***N***O_3^-
   i. ***S***O_4^{2-}
   j. ***P***$_3O_{10}^{5-}$
   k. ***S***$_2O_3^{2-}$

3. Indicate the oxidation number of the italicized element in the following compounds:
   a. ***P***Cl_3
   b. ***P***Cl_5
   c. ***P***OCl_2
   d. ***S***O_2
   e. ***S***O_3
   f. SCl_2
   g. ***Cr***Cl_3
   h. K_2***Cr***O_4
   i. ***Cr***$_2O_3$
   j. ***Mn***O_2
   k. K***Mn***O_4
   l. ***Mn***$_2O_7$

Balance the following equations that are in **acidic** solution:

1. $H_2S_{(g)} + NO_3^-{}_{(aq)} \rightarrow NO_{(g)} + S_{(s)}$

2. $MnO_4^-{}_{(aq)} + Cl^-{}_{(aq)} \rightarrow Cl_{2(g)} + Mn^{2+}{}_{(aq)}$

3. $Cl^-{}_{(aq)} + Cr_2O_7^{2-}{}_{(aq)} \rightarrow Cr^{3+}{}_{(aq)}\ Cl_{2(g)}$

4. $HgS_{(s)} + NO_3^-{}_{(aq)} + Cl^-{}_{(aq)} \rightarrow HgCl_4^{2-}{}_{(aq)} + NO_{(g)} + S_{(s)}$

5. $Fe^{2+}{}_{(aq)} + MnO_4^-{}_{(aq)} \rightarrow Fe^{3+}{}_{(aq)} + Mn^{2+}{}_{(aq)}$

6. $BiO_3^-{}_{(aq)} + Mn^{2+}{}_{(aq)} \rightarrow MnO_4^-{}_{(aq)} + Bi^{3+}{}_{(aq)}$

7. $WO_{3(s)} + Sn^{2+}{}_{(aq)} + Cl^-{}_{(aq)} \rightarrow W_3O_{8(s)} + SnCl_6^{2-}{}_{(aq)}$

8. $NiO_{2(s)} + Ag_{(s)} \rightarrow Ni^{2+}{}_{(aq)} + Ag^+{}_{(aq)}$

9. $Fe^{3+}{}_{(aq)} + H_2S_{(g)} \rightarrow Fe^{2+}{}_{(aq)} + S_{(s)}$

10. $PbO_{2(s)} + Mn^{2+}{}_{(aq)} \rightarrow Pb^{2+}{}_{(aq)} + MnO_4^-{}_{(aq)}$

11. $TcO_4^-{}_{(aq)} + Ti_{(s)} \rightarrow Tc^{2+}{}_{(aq)} + Ti^{3+}{}_{(aq)}$

12. $IO_{3(aq)} + I^-{}_{(aq)} \rightarrow I_{2(s)}$

13. $C_2H_{4(g)} + MnO_4^-{}_{(aq)} \rightarrow Mn^{2+}{}_{(aq)} + CO_{2(g)}$

Balance the following equations that are in **basic** solution:

1. $Cr^{3+}{}_{(aq)} + MnO_{2(s)} \rightarrow Mn^{2+}{}_{(aq)} + CrO_4^{2-}{}_{(aq)}$

2. $Bi(OH)_{3(s)} + SnO_2^{2-}{}_{(aq)} \rightarrow Bi_{(s)} + SnO_3^{2-}{}_{(aq)}$

3. $MnO_4^{2-}{}_{(aq)} \rightarrow MnO_4^-{}_{(aq)} + MnO_{2(s)}$

4. $Mn_2^+{}_{(aq)} + Br_{2(l)} \rightarrow MnO_{2(s)} + Br^-{}_{(aq)}$

5. $Cr^{3+}{}_{(aq)} + H_2O_{2(aq)} \rightarrow CrO_4^{2-}{}_{(aq)}$

6. $Ag_{2(s)} + HPO_3^{2-}{}_{(aq)} \rightarrow Ag_{2(s)} + PO_4^{3-}{}_{(aq)}$

7. $NO_2^-{}_{(aq)} + MnO_4^-{}_{(aq)} \rightarrow NO_3^-{}_{(aq)}\ MnO_{2(s)}$