ASSIGNING OXIDATION NUMBERS – WORKSHEET 1

Part A:

In the following questions, give the oxidation number of the indicated atoms/ion.

1. N in N_2O_3 _____
2. S in H_2SO_4 _____
3. C _____
4. C in CO _____
5. Na in NaCl _____
6. H in H_2O _____
7. Ba in $BaCl_2$ _____
8. N in NO_2^- _____
9. S in Al_2S_3 _____
10. S in HSO_4^- _____
11. Cl in $Fe(ClO_2)_3$ _____
12. Fe in $Fe(ClO_2)_3$ _____
13. N in NO_3^- _____
14. Cu^{2+} _____
15. Zn^{2+} _____
16. C in CH_4 _____
17. Mn in MnO_2 _____
18. S in SO_3^{2-} _____
19. Mg^{2+} _____
20. Cl^- _____
21. O_2 _____
22. P_4 _____
23. Na in Na_2S _____
24. S in H_2S _____
25. Ca^{2+} _____
26. C in CN^- _____
27. H in OH^- _____
28. Mn in $KMnO_4$ _____
29. I in $Mg(IO_3)_2$ _____
30. C in $C_2O_4^{2-}$ _____

Part B:

Identify the species being oxidised and reduced in each of the following reactions and write their half reactions:

1. $2\ Cr^{+} + Sn^{4+} \rightarrow 2\ Cr^{3+} + Sn^{2+}$

   Oxidised:_____ Reduced:_____

2. $3\ Hg^{2+} + 2\ Fe\ (s) \rightarrow 3\ Hg_2 + 2\ Fe^{3+}$

   Oxidised:_____ Reduced:_____

3. $2\ As\ (s) + 3\ Cl_2\ (g) \rightarrow 2\ AsCl_3$.

   Oxidised:_____ Reduced:_____

4. $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$

   Oxidized:_____ Reduced:_____

5. $C + H_2SO_4 \rightarrow CO_2 + SO_2 + H_2O$

   Oxidised:_____ Reduced:_____

6. $HNO_3 + HI \rightarrow NO + I_2 + H_2O$

   Oxidised:_____ Reduced:_____

7. $KMnO_4 + HCl \rightarrow MnCl_2 + Cl_2 + H_2O + KCl$

   Oxidised:_____ Reduced:_____

8. $Sb + HNO_3 \rightarrow Sb_2O_3 + NO + H_2O$

   Oxidised:_____ Reduced:_____

Part C:

Which one of the following reactions is NOT a redox reaction?

(a) $2Cr^{2+}_{(aq)} + 2H^{+}_{(aq)} \rightarrow 2Cr^{3+}_{(aq)} + H_{2(g)}$

(b) $(NH_4)_2Cr_2O_{7(s)} \rightarrow N_{2(g)} + 4H_2O_{(g)} + Cr_2O_{3(s)}$

(c) $2CrO^{2-}_{4(aq)} + 2H^{+}_{(aq)} \rightarrow Cr_2O^{2-}_{7(aq)} + H_2O_{(l)}$

(d) $Cr_2O_{3(s)} + 3C_{(s)} \rightarrow 2Cr_{(s)} + 3CO_{(g)}$

As

ANSWERS

Part A:

1. +3
2. +6
3. 0
4. +2
5. +1
6. +1
7. +2
8. +3
9. -2
10. +6
11. +3
12. +3
13. +5
14. +2
15. +2
16. -4
17. +4
18. +4
19. +2
20. -1
21. 0
22. 0
23. +1
24. -2
25. +2
26. -4
27. +1
28. +7
29. +5
30. +3

Part B:

1. Oxidised = Cr^{+} Reduced = Sn^{4+}
2. Oxidised = Fe Reduced = Hg^{2+}
3. Oxidised = As Reduced = Cl_2
4. Oxidised = Zn Reduced = Cu^{2+}
5. Oxidised = C Reduced = H_2SO_4
6. Oxidised = HI Reduced = HNO_3
7. Oxidised = HCl Reduced = $KMnO_4$
8. Oxidised = Sb Reduced = HNO_3

Part C:

(c) is not a redox reaction.