CH19 Dynamic Equilibrium (Part 1)

Redox reaction in terms of e transfer

- 1. What is oxidation?
- 2. What is reduction?

$$2Mg(s) + O_2(g) \rightarrow 2MgO(s)$$

- 3. Write the half-equations for the above reaction.
- 4. Which half-equation is oxidation or reduction?
- 5. From the half-equations, write the overall eqn.
- 6. Which is oxidizing agent?
- 7. Which is reducing agent?

Redox reaction in terms of O.N.

- 1. What is oxidation?
- 2. What is reduction?

$$2Mg(s) + O_2(g) \rightarrow 2MgO(s)$$

- 3. Calculate the O.N. of each element.
- 4. Indicate which species are oxidized or reduced.
- 5. Indicate which species are oxidizing or reducing agents.
- 6. What are the advantages of using O.N. for predict a redox reaction?

Assigning O.N.

- 2. Group I ions = _____
- 3. Group II ions = _____
- 4. For covalent compounds, H = _____ e.g. HCl(g), H₂SO₄(l),CH₄(g) For ionic compounds, H = ____ e.g LiH, NaH
- 5. O =_____ except H_2O_2 , O =_____
- 6. F always = _____
- 7. Cl, Br, and I = ____ except with F or O e.g. HOCl where Cl = ____
- 8. For a neutral compound, sum of O.N. = $\underline{0}$
- 9. For a polyatomic ion, sum of O.N. = the charge of that ion

Check-point

1. Calculate the O.N. of N

a) Li₃N

b) N₂O₃

c) NH₃

d) N_2O_4

e) N₂O

f) $[Ni(NH_3)_4]^{2+}$

2. Calculate the O.N. of **P**

a) H₃PO₄

b) Na₃P

c) PCl₃

d) PCl₅

e) H₃PO₂

f) H₃PO₃

3. Calculate the O.N. of Fe

a) K₂FeO₄

b) $Fe(H_2O)_6^{2+}$

c) $K_3Fe(CN)_6$

d) FeF₆³-

Disporoportionation

A chemical Rx, in which <u>single specie</u> undergo both <u>oxidation</u> and <u>reduction</u> simultaneously.

$$H_2O_2 \rightarrow 2H_2O + O_2$$

$$3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^{-} + MnO_2 + 2H_2O$$

Balancing Redox Equation in Acidic Solution

In acidic medium, using:

H⁺ to balance no. of H atom

H₂O to balance no. of O atom

Example 1

Balance the following equation in acidic medium.

$$MnO_4^- + I^- \rightarrow Mn^{2+} + I_2$$

Check-Point

Q1
$$H_2O_2 + I^- \rightarrow H_2O + I_2$$

Q2
$$SO_2 + Cr_2O_7^{2-} \rightarrow SO_4^{2-} + Cr^{3+}$$

Q3
$$I^{-} + SO_4^{2-} \rightarrow I_2 + S^{2-}$$

Q4
$$VO_3^- + Sn \rightarrow V^{3+} + Sn^{2+}$$

Q5
$$IO_3^- + I^- \rightarrow I_2$$

Q6
$$\operatorname{MnO_4}^{2-} \longrightarrow \operatorname{MnO_2} + \operatorname{MnO_4}^{-}$$

Balancing Redox Equation in Alkaline Solution

In alkaline medium, using:

H₂O to balance no. of H atom OH⁻ to balance no. of O atom

Example 1

Balance the following equation in *alkaline* medium.

$$Cr(OH)_3 + IO_3^- \rightarrow CrO_4^{2-} + I^-$$

Check-Point

Q1.
$$\text{ClO}^{-} + \text{CrO}_2^{-} \rightarrow \text{Cl}^{-} + \text{CrO}_4^{2-}$$

Q2.
$$P_4 \rightarrow PH_3 + H_2PO_2$$

Q3.
$$A1 + NO_3^- \rightarrow A1(OH)_4^- + NH_3$$