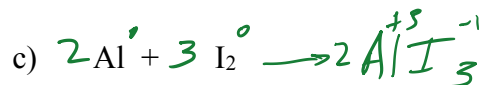
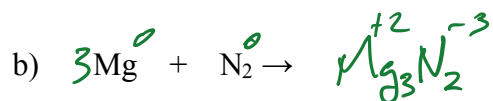
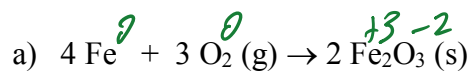
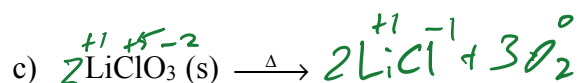
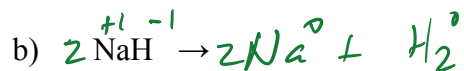
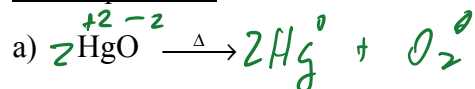
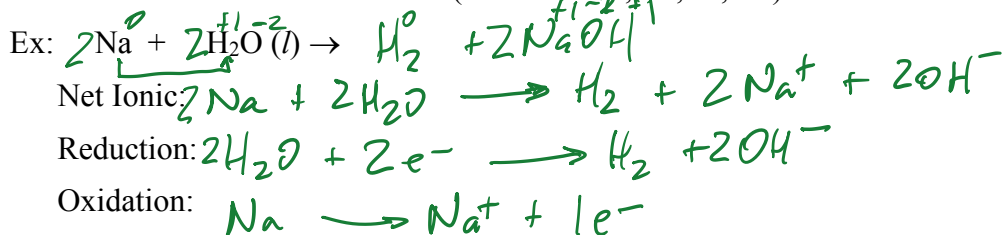


Types of Redox Reactions and Activity Series

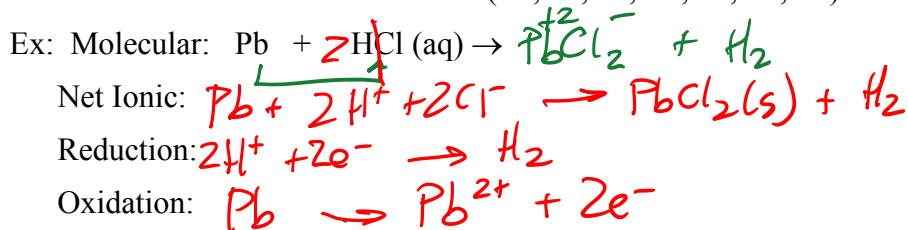
Types of Redox Reactions1) Combination (Synthesis): $A + B \rightarrow AB$ 2) Decomposition: $AB \rightarrow A + B$ 3) Displacement (Single-Replacement) Reactions: (Use Reduction Potential Chart to determine whether reactions occur.)

a) **Hydrogen Displacement:** Metal + H_2O or acid $\rightarrow \text{H}_2$ + an ionic ($\text{M} + \text{HX} \rightarrow \text{H}_2 + \text{MX}$)

i) Reactive metals react with water. (alkali metals, Ca, Sr, Ba)



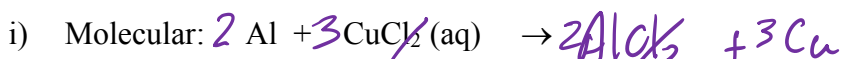
ii) Less reactive metals react with acids (Zn, Al, Fe, Co, Ni, Sn, Pb)



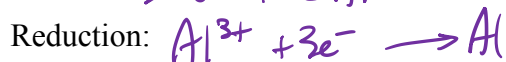
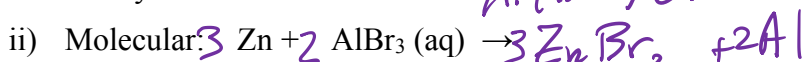
iii) Non-reactive metals do not react with water or acid (Cu, Hg, Ag, Au, Pt)

* These metals are less easily oxidized than H_2 .

b) **Metal Displacement:** metal + ionic \rightarrow other metal + ionic (Metal atoms switch places.) $A + BC \rightarrow B + AC$



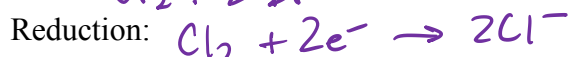
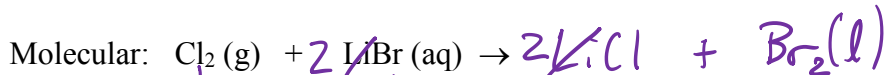
**Why does this reaction occur? *Al (lower) easier to oxidize than Cu*



**This reaction does not occur. Why not? *Zn is harder to oxidize than Al (higher)*

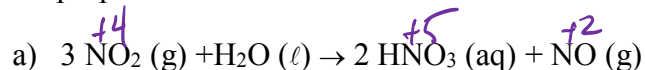
c) **Halogen Displacement:** halogen + halide compound \rightarrow other halogen + halide compound ($X_2 + MY \rightarrow Y_2 + MX$)

** *Of the halogens, fluorine has the highest electronegativity. Thus, it attracts electrons the most strongly. Thus, it is the most easily reduced. ($F_2 \rightarrow F^-$ easily) Thus, the order of activity for the halogens is $F_2 > Cl_2 > Br_2 > I_2$*

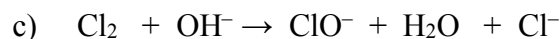
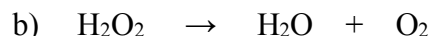


Does this reaction occur? *Y - Cl_2 easier to reduce than Br (more +)*

4) Disproportionation Reaction: One element is simultaneously oxidized & reduced:



Element must start in an intermediate Ox. state



5) Comproportionation/Synproportionation Reaction (Not in book): Two atoms of the same element in different species oxidized & reduced to the same oxidation number (The opposite of disproportionation)



6) Combustion Reaction (Not mentioned in book.)

* An organic molecule (C, H, O, N, S) combines with oxygen. (Usually forms carbon dioxide and water.)

