A few examples of precipitation and acid/base:

* Transition metals DO NOT change their charge in exchange reactions!

$CaCl_2(aq) + 2\,AgNO_3(aq) \longrightarrow 2\,AgCl(s) + Ca(NO_3)_2(aq)$ ✓

Ca^{2+} Cl^- Ag^+ NO_3^-

This reaction is driven by the formation of SOLID AgCl. Precipitation.

$H_3PO_4(aq) + 3\,NaOH(aq) \longrightarrow 3\,H_2O(l) + Na_3PO_4(aq)$ ✓

H^+ PO_4^{3-} Na^+ OH^-

This reaction is driven by the formation of WATER MOLECULES. Acid/base.

$KCl(aq) + NaNO_3(aq) \longrightarrow$ ~~$KNO_3(aq) + NaCl(aq)$~~ NO REACTION

K^+ Cl^- Na^+ NO_3^-

This reaction forms no solids and no stable molecules. So, there's no driving force, and the best way to describe this one is NO REACTION.

$Ca(NO_3)_2(aq) + Na_2CO_3(aq) \longrightarrow CaCO_3(s) + 2\,NaNO_3(aq)$ ✓

Ca^{2+} NO_3^- Na^+ CO_3^{2-}

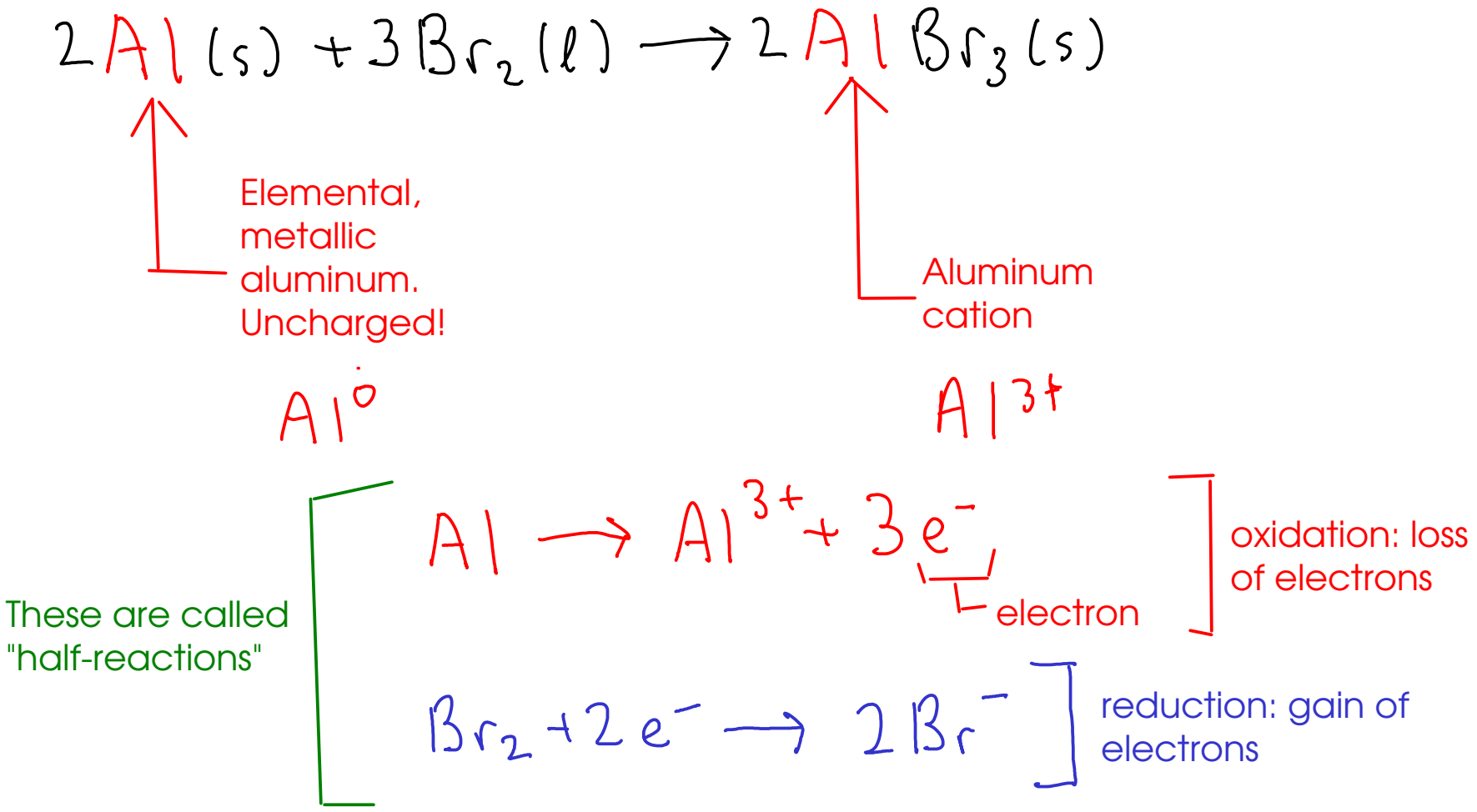
Thiis reaction is driven by the formation of SOLID calcium carbonate. Precipitation.

OXIDATION / REDUCTION CHEMISTRY

- Precipitation reactions involve ions pairing up, but the ions themseves are not formed in precipitation reactions. Precipitation reactions (and quite a few others) start with pre-existing ions.

... but ions have to be produced somehow - through a chemistry that involves the transfer of electrons.

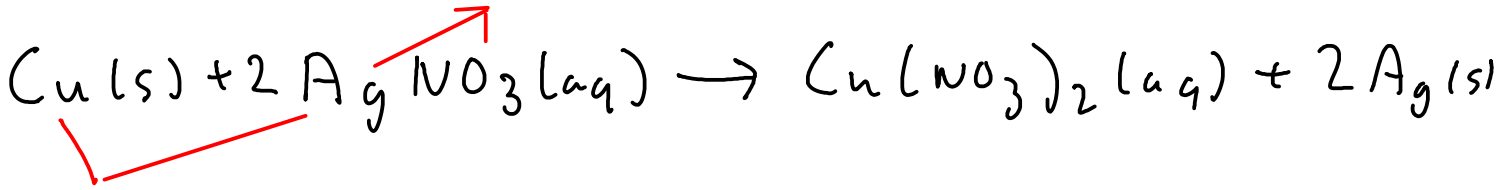
- OXIDATION/REDUCTION chemistry ("REDOX" chemistry) involves transfer of electrons and can make ions.



- oxidation and reduction always occur together. In other words, we can't just make free electrons using oxidation without giving them somewhere to go.

- Many of the types of reactions that you might have heard of before are actually redox reactions!

- SINGLE REPLACEMENT reactions



$Cu \rightarrow Cu^{2+} + 2e^-$ oxidation

$2Ag^+ + 2e^- \rightarrow 2Ag(s)$ reduction

net ionic → $Cu(s) + 2Ag^+(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$

- COMBUSTION reactions (burning)

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

$2Mg(s) \rightarrow 2Mg^{2+} + 4e^-$ oxidation

$O_2(g) + 4e^- \rightarrow 2O^{2-}$ reduction