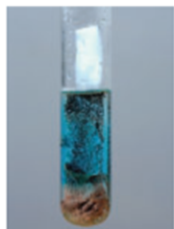


## Topic 2 - Creating and Understanding the Table of Reduction Half Reactions

The transfer of electrons between two entities (atoms, ions, molecules) in a redox reaction can be thought of a tug of war for electrons

If one reactant is able to pull electrons away from the other, a **spontaneous** reaction occurs (**Figure 1**).

If not, no reaction occurs (**Figure 2**).



**Figure 1**  
Copper(II) ions react spontaneously with zinc metal. A copper(II) ion has a stronger attraction for the valence electrons of a zinc atom than zinc does.



**Figure 2**  
When a strip of copper is placed in a solution of nickel(II) ions, the green nickel(II) ion colour remains and the copper metal does not react. Collisions between copper atoms and nickel(II) ions apparently do not result in the transfer of electrons.

non-spontaneous

Without mixing all possible reactants and observing any evidence of reaction, how can we predict if a reaction will occur? If a reaction occurs, what will be produced?

By observing many successful and unsuccessful reactions, patterns emerge and empirical generalizations can be made.

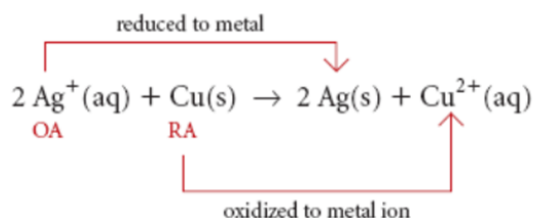
### Oxidizing and Reducing Agents

- A **reducing agent** causes reduction by donating (losing) electrons to another substance in a redox reaction.

- During this process, the reducing agent is oxidized

- A **oxidizing agent** causes oxidation by removing (gaining) electrons from another substance in a redox reaction.

- During this process, the oxidizing agent is reduced



oxidized - RA

reduced  
OA

	Cu(s)	Pb(s)	Ag(s)	Zn(s)
Cu <sup>2+</sup> (aq)	xx	S	NS	S
Pb <sup>2+</sup> (aq)	NS	xx	NS	S
Ag <sup>+</sup> (aq)	S	S	xx	S
Zn <sup>2+</sup> (aq)	NS	NS	NS	xx

