A brief review of redox chemistry:

Name of process by change in charge (or unused non-name)	Name of process by typical driving element (or unused non-name)	Change in electrons	Resultant change in charge	Examples	Sources or sinks for electrons
(Augmentation??)	**Oxidation**	Loss of electrons	Increase	From Fe^{2+} to Fe^{3+} From S^{2-} to S^0 to S^{4+} to S^{6+} (e.g. H_2S -> SO_4^{2-}) From C^{4-} to C^0 to C^{4+} (e.g. CH_2O -> CO_2)	Sinks (e^- acceptors) (oxidizers): O_2 * Fe^{3+} Mn^{4+} S^{6+} in SO_4^{2-} N^{5+} in NO_3^- C^0 in CH_2O
Reduction	(organicarboniation??) (sodiation??)	Gain of electrons	Decrease	From Fe^{3+} to Fe^{2+} From S^{6+} to S^{4+} to S^0 to S^{2-} (e.g. SO_4^{2-} -> H_2S) From C^{4+} to C^0 to C^{4-} (e.g. CO_2 -> CH_2O) From O^0_2 to $2O^{2-}$	Sources (e^- donors) (reducers): C^0 in CH_2O * Fe^{2+} Mn^{2+} S^{2-} in H_2S

Hence the name (Oxidation)

Hence the name (Reduction)

Note that redox state is a concept applicable only to atoms and not well applied directly to the chemical species in which they are found. For example, C in H_2CO_3, HCO_3^-, and CO_3^{2-} is all C of one oxidation state (C^{4+}), despite the difference in charge of the C-bearing species. On the other hand, S in SO_3^{2-} and SO_4^{2-} has two different oxidation states (S^{4+} and S^{6+}), even though the charge on the two S-bearing species is the same.

A huge, and hugely important, redox reaction:

30 x 2 = 60 e⁻ gained

(4x6) + (4x8) = 56 e⁻ lost

4 x 1 = 4 e⁻ lost

$$4FeS_2 + 15O_2 + 14H_2O \rightarrow 4Fe(OH)_3 + 8SO_4^{2-} + 16H^+$$

Note that electrons gained and lost must balance.

* Because photosynthesis produces CH_2O (generic organic matter) and O_2, a lot of natural redox chemistry can be viewed as undoing photosynthesis.

2 x 2 = 4 e^- lost

1 x 4 = 4 e^- gained

$$CO_2 + H_2O \rightarrow CH_2O + O_2$$

Photosynthesis to produce the modern oxygenated atmosphere

2 x 2 = 4 e^- gained

1 x 4 = 4 e^- lost

$$CH_2O + O_2 \rightarrow CO_2 + H_2O$$

Oxidation of organic matter; burning of fossil fuels