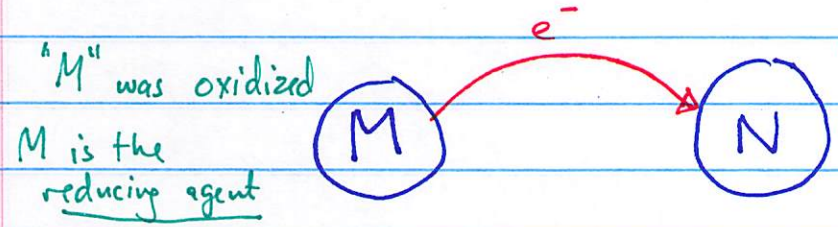
# Redox rxns

Reduction-Oxidation rxns : $e^-$ transfer.




Oxidation : when something loses e⁻s
Reduction : " ——— " gains e⁻s.

OIL-RIG Ox is loss, red is gain (e⁻s)
LEO-goes-GER loss of e⁻s is oxidation
gain of e⁻s is reduction.

If M loses e⁻s (oxidized) its charge becomes more +ve, charge ↑

if N gains e⁻s (red) its charge becomes more -ve charge ↓

We'll talk about hypothetical charges...
OXIDATION STATES/NUMBERS (OX#)

How do we assign ox#?

- we assign to each individual atom

## RULES

1) Elements = $\emptyset$ — $\overset{(0)}{Na}$, $\overset{(0)}{O_2}$, $\overset{(0)}{P_4}$

2) Monatomic ion = 'charge' — $\overset{(+1)}{Na^+}$, $\overset{(-2)}{O^{2-}}$, $\overset{(-3)}{P^{3-}}$

charge: #±, ox #: ±#

3) Oxygen in cpds: −2 (unless F is present) — $H_2\overset{(-2)}{O}$, $\overset{(-2)}{CO_2}$, $\overset{(?)}{O_2F}$

4) Hydrogen in cpds: +1 (unless metal hydride: −1) — $\overset{(+1)}{H_2O}$, $\overset{(+1)}{CH_4}$, $\overset{(-1)}{CaH_2}$

$\overset{(+2)}{Ca^{2+}}\ \overset{(-1)}{H^-}\ \overset{(-1)}{H^-}$

5) Fluorine is always −1 in cpds; other halogens in cpds are −1; but... if there are two diff't halogens – the highest one in gp is −1. If O is also present, ... (?) — $\overset{(-1)}{HF}$, $\overset{(-1)}{HCl}$; $\overset{(-1)\ ?}{ClBr}$; $\overset{(?)\ (-2)}{Cl_2O}$

6) Sum of every atom's ox # = charge

(+1) (−2)

$Cl_2O$

(−4) (+1)

$CH_4$

(+1) (+1) (−2)

$ClClO$

sum = ∅

(−4) +1 +1 +1 +1

CHHHH

sum = ∅

(+5) (−2)

$PO_4^{3-}$

sum = 3−

(+5) −2 −2 −2 −2 3−

POOOO

3−

(+4) (−2)

$SO_3^{2-}$

(+6) (−2)

$SO_4^{2-}$

(+2) (−2)

$S_2O_3^{2-}$

? ? (−2)

$NaNO_2$ (sodium nitrite

(+1) (+3) (−2) ... break into ions 1st!)

$Na^+ \; NO_2^-$

$Fe_3O_4$

$(+\frac{8}{3})$ $(+\frac{8}{3})$ $+(\frac{8}{3})$ (−2) (−2) (−2) (−2)

Fe Fe Fe O O O O

+8 −8

really: $Fe^{3+} \; Fe^{3+} \; Fe^{2+}$