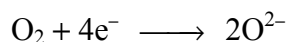
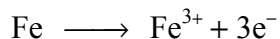


4.41 Is it possible to have a reaction in which oxidation occurs and reduction does not? Explain
No; a redox reaction must contain both a reduction and an oxidation. Electrons must come from and go to some species simultaneously.

4.44 For the complete redox reactions given below, write the half-reactions and identify the oxidizing and reducing agents.



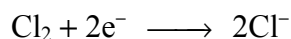
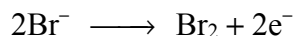
The product is an ionic compound whose ions are Fe^{3+} and O^{2-} .



O_2 is the oxidizing agent (was reduced); Fe is the reducing agent (was oxidized).



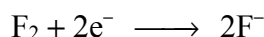
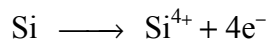
Na^+ does not change in this reaction. It is a "spectator ion."



Cl_2 is the oxidizing agent (was reduced); Br^- is the reducing agent (was oxidized).



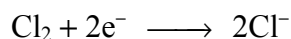
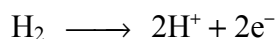
Assume SiF_4 is made up of Si^{4+} and F^- .



F_2 is the oxidizing agent (was reduced); Si is the reducing agent (was oxidized).

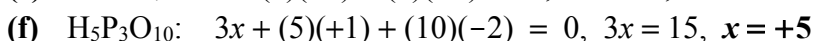
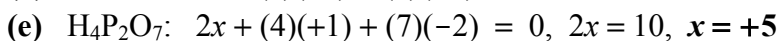
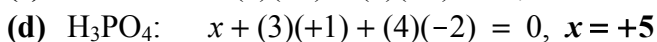
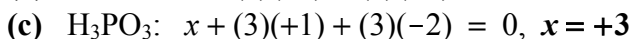
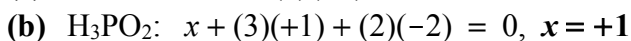
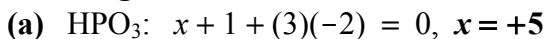


Assume HCl is made up of H^+ and Cl^- .



Cl_2 is the oxidizing agent (was reduced); H_2 is the reducing agent (was oxidized).

4.46 Phosphorus forms many oxoacids. Indicate the oxidation number of phosphorus in each of the following acids:



The molecules in part (a), (e), and (f) can be made by strongly heating the compound in part (d). Are these oxidation-reduction reactions?

4.47 Give the oxidation number of the underlined atoms in the following molecules and ions:

- | | |
|--|---|
| (a) $\underline{\text{C}}\text{IF}$: F -1, Cl +1 | (b) $\underline{\text{I}}\text{F}_7$: F -1, I +7 |
| (c) $\underline{\text{C}}\text{H}_4$: H +1, C -4 | (d) $\underline{\text{C}}_2\text{H}_2$: H +1, C -1 |
| (e) $\underline{\text{C}}_2\text{H}_4$: H +1, C -2, | (f) $\text{K}_2\underline{\text{C}}\text{rO}_4$: K +1, O -2, Cr +6 |
| (g) $\text{K}_2\underline{\text{C}}\text{r}_2\text{O}_7$: K +1, O -2, Cr +6 | (h) $\text{K}\underline{\text{M}}\text{nO}_4$: K +1, O -2, Mn +7 |
| (i) $\text{NaH}\underline{\text{C}}\text{O}_3$: Na +1, H +1, O -2, C +4 | (j) $\underline{\text{Li}}_2$: Li 0 |
| (k) $\text{Na}\underline{\text{I}}\text{O}_3$: Na +1, O -2, I +5 | (l) $\text{K}\underline{\text{O}}_2$: K +1, O -1/2 |
| (m) $\underline{\text{P}}\text{F}_6^-$: F -1, P +5 | (n) $\text{K}\underline{\text{A}}\text{uCl}_4$: K +1, Cl -1, Au +3 |

4.50 Give the oxidation number of the underlined atoms in the following molecules and ions:

- | | |
|---|--|
| (a) $\underline{\text{Mg}}_3\text{N}_2$: N: -3 | (b) $\text{Cs}\underline{\text{O}}_2$: O: -1/2 |
| (c) $\text{Ca}\underline{\text{C}}_2$: C: -1 | (d) CO_3^{2-} : C: +4 |
| (e) $\text{C}_2\underline{\text{O}}_4^{2-}$: C: +3 | (f) $\text{Zn}\underline{\text{O}}_2^{2-}$: O: -2 |
| (g) $\text{Na}\underline{\text{B}}\text{H}_4$: B: +3 | (h) $\underline{\text{W}}\text{O}_4^{2-}$: W: +6 |

4.142 What is the oxidation number of O in HFO?

Structurally this is actually HOF: Using the rules for assigning oxidation numbers given in Section 4.4, H is +1, F is -1, so the oxidation number of O must be **zero**.