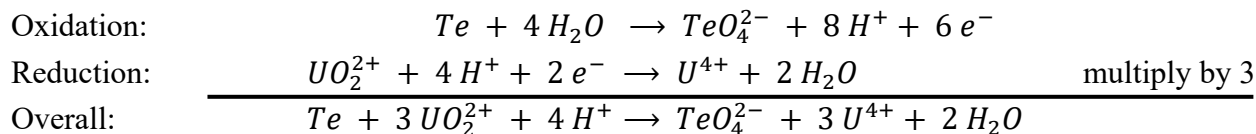


Answers to Exercise 9.2

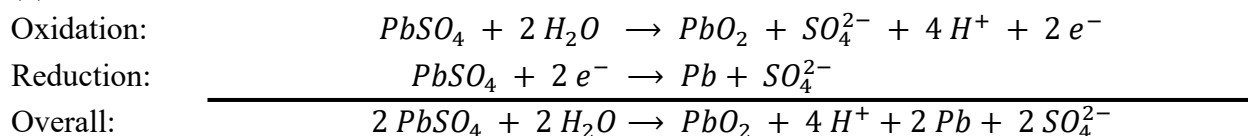
Balancing Redox Reactions

1.

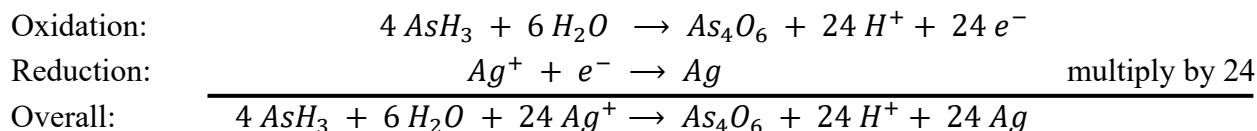
(a)



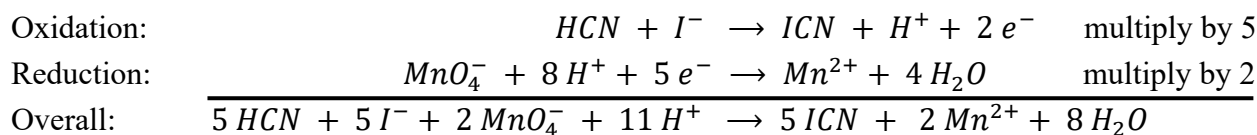
(b)



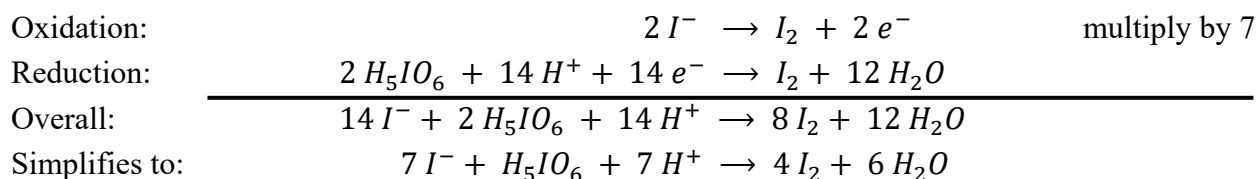
(c)



(d)

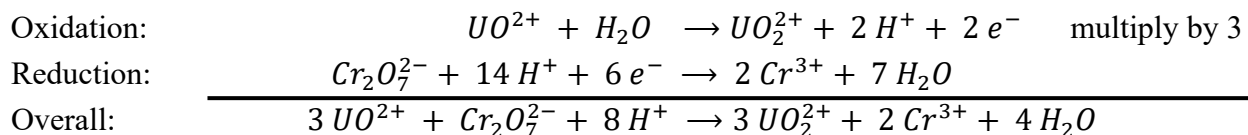


(e)



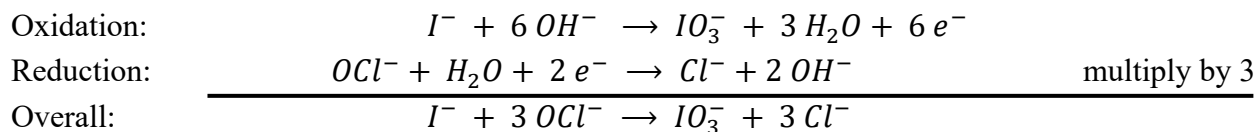
This is an example of a comproportionation reaction, a reaction in which the same species (I_2) is produced by both the oxidation and reduction half reactions.

(f)

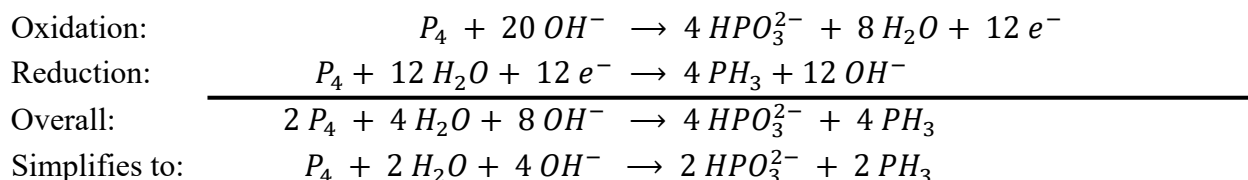


2.

(a)

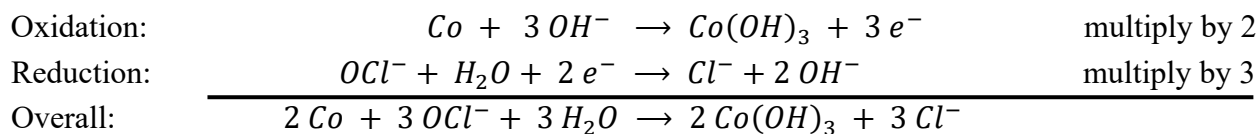


(b)

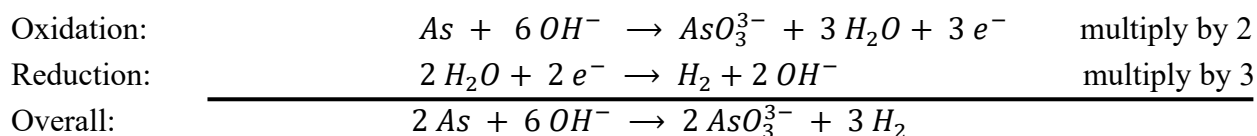


This is an example of a disproportionation reaction, a reaction in which the same species (P_4) is consumed by both the oxidation and reduction half reactions.

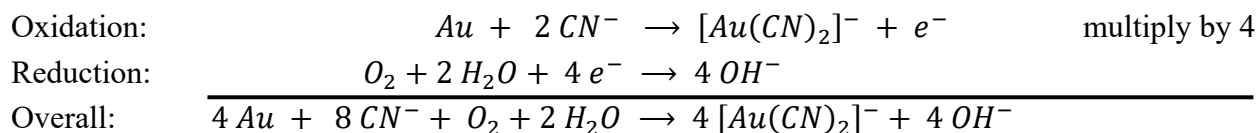
(c)



(d)



(e)



While gold is not oxidized by oxygen in aqueous solution, addition of cyanide makes this possible. This reaction is heavily used in gold mining operations, especially if the gold concentration of the ores is low. The "cyanide ponds" that are used for this extraction process are serious environmental hazards given the huge quantities of such a toxic substance!