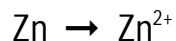
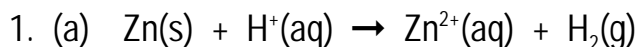
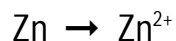


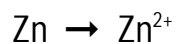
ANSWERS



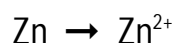
write the half-reaction



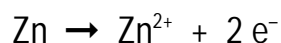
balance all elements except O and H (Zn is balanced)



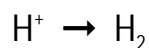
add water molecules to balance the oxygen (no oxygen)



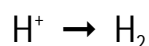
add hydrogen ions to balance hydrogen (no hydrogen)



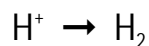
add electrons to balance the charge (this is the oxidation half-reaction because the electrons end up on the product side)



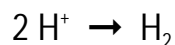
write the half-reaction



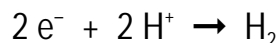
balance all elements except O and H (no other elements)



add water molecules to balance the oxygen (no oxygen)



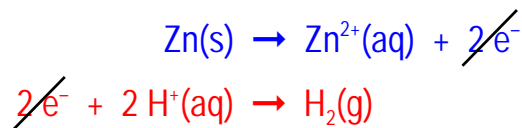
add hydrogen ions to balance hydrogen

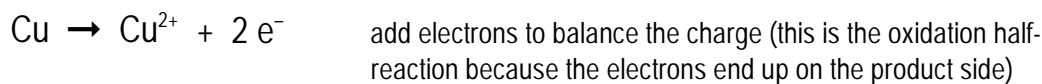
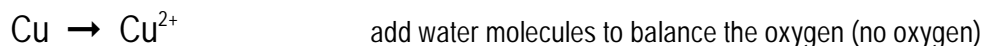
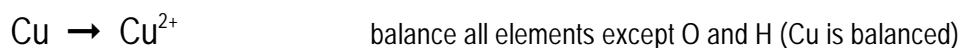
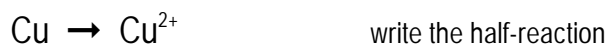
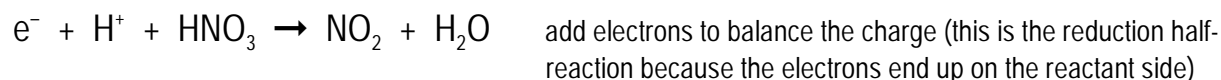
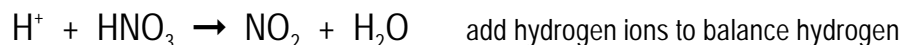
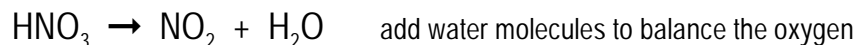
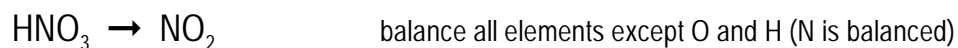
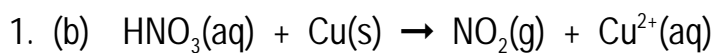


add electrons to balance the charge (this is the reduction half-reaction because the electrons end up on the reactant side)

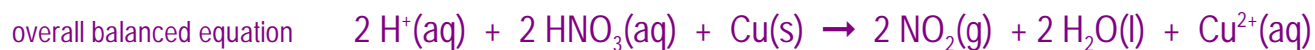
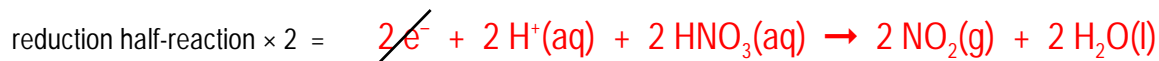


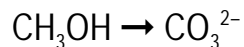
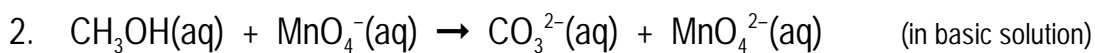
Add the half-reaction equations (the electron transfer is balanced; 2e^- in each half-reaction).



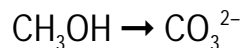


Add the half-reaction equations after balancing the electron transfer.

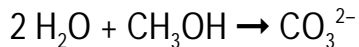




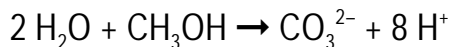
write the half-reaction



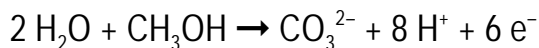
balance all elements except O and H



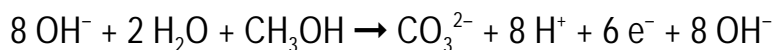
add water molecules to balance the oxygen



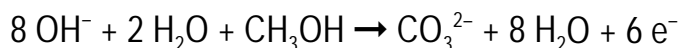
add hydrogen ions to balance hydrogen



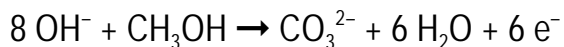
add electrons to balance the charge



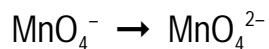
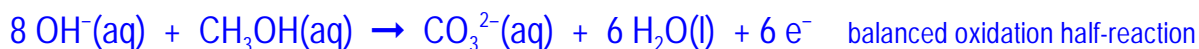
to both sides, add OH^- to equal to number of H^+



combine OH^- and H^+ to make H_2O



reduce water (remove 2 H_2O from both sides)



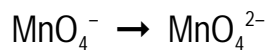
write the half-reaction



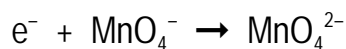
balance all elements except O and H (Mn is balanced)



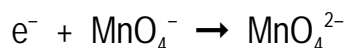
add water molecules to balance the oxygen (oxygen is balanced)



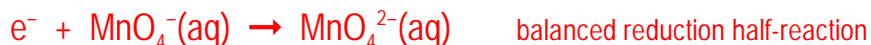
add hydrogen ions to balance hydrogen (no hydrogen)



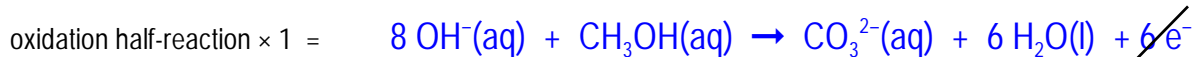
add electrons to balance the charge



there are no H^+ so no OH^- are added



Add the half-reaction equations after balancing the electron transfer.



overall balanced equation

