
NUMERICAL ANSWERS TO ASSIGNED TUTORIAL PROBLEM SETS FOR CHEM205
FROM KOTZ & TREICHEL'S CHEMISTRY & CHEMICAL REACTIVITY, 6th Ed.
-----**NOTE: none of the answers from Ch.20 have been verified. Please report any errors.**

Ch.	Q#	Comments
20	2a	ox: $\text{H}_2\text{O}_2(\text{aq}) \rightarrow \text{O}_2(\text{g}) + 2\text{H}^+(\text{aq}) + 2\text{e}^-$
20	2b	ox: $\text{H}_2\text{C}_2\text{O}_4(\text{aq}) \rightarrow 2\text{CO}_2(\text{g}) + 2\text{H}^+(\text{aq}) + 2\text{e}^-$
20	2c	red: $\text{NO}_3^-(\text{aq}) + 4\text{H}^+(\text{aq}) + 3\text{e}^- \rightarrow \text{NO}(\text{g}) + 2\text{H}_2\text{O}(\text{l})$
20	2d	red: $\text{MnO}_4^-(\text{aq}) + 2\text{H}_2\text{O}(\text{l}) + 3\text{e}^- \rightarrow \text{MnO}_2(\text{s}) + 4\text{OH}^-(\text{aq})$
20	4a	$\text{Sn}(\text{s}) \rightarrow \text{Sn}^{2+}(\text{aq}) + 2\text{e}^-$
20	4a	$2\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{H}_2(\text{g})$
20	4a	net: $\text{Sn}(\text{s}) + 2\text{H}^+(\text{aq}) \rightarrow \text{Sn}^{2+}(\text{aq}) + \text{H}_2(\text{g})$
20	4b	$\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + 14\text{H}^+(\text{aq}) + 6\text{e}^- \rightarrow 2\text{Cr}^{3+}(\text{aq}) + 7\text{H}_2\text{O}(\text{l})$
20	4b	$6[\text{Fe}^{2+}(\text{aq}) \rightarrow \text{Fe}^{3+}(\text{aq}) + 1\text{e}^-]$
20	4b	net: $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + 14\text{H}^+(\text{aq}) + 6\text{Fe}^{2+}(\text{aq}) \rightarrow 2\text{Cr}^{3+}(\text{aq}) + 7\text{H}_2\text{O}(\text{l}) + 6\text{Fe}^{3+}(\text{aq})$
20	4c	$\text{MnO}_2(\text{s}) + 4\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{Mn}^{2+}(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
20	4c	$2\text{Cl}^-(\text{aq}) \rightarrow \text{Cl}_2(\text{g}) + 2\text{e}^-$
20	4c	net: $\text{MnO}_2(\text{s}) + 4\text{H}^+(\text{aq}) + 2\text{Cl}^-(\text{aq}) \rightarrow \text{Mn}^{2+}(\text{aq}) + 2\text{H}_2\text{O}(\text{l}) + \text{Cl}_2(\text{g})$
20	4d	$\text{CH}_2\text{O}(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{HCO}_2\text{H}(\text{aq}) + 2\text{H}^+(\text{aq}) + 2\text{e}^-$
20	4d	$2[\text{Ag}^+(\text{aq}) + \text{e}^- \rightarrow \text{Ag}(\text{s})]$
20	4d	net: $\text{CH}_2\text{O}(\text{aq}) + \text{H}_2\text{O}(\text{l}) + 2\text{Ag}^+(\text{aq}) \rightarrow \text{HCO}_2\text{H}(\text{aq}) + 2\text{H}^+(\text{aq}) + 2\text{Ag}(\text{s})$
20	6a	net: $3\text{Fe}(\text{OH})_3(\text{s}) + \text{Cr}(\text{s}) \rightarrow 3\text{Fe}(\text{OH})_2(\text{s}) + \text{Cr}(\text{OH})_2(\text{s})$
20	6b	net: $\text{NiO}_2(\text{s}) + 2\text{H}_2\text{O}(\text{l}) + \text{Zn}(\text{s}) \rightarrow \text{Ni}(\text{OH})_2(\text{s}) + \text{Zn}(\text{OH})_2(\text{s})$
20	6c	net: $3\text{Fe}(\text{OH})_3(\text{s}) + \text{CrO}_4^{2-}(\text{aq}) + 4\text{H}_2\text{O}(\text{l}) \rightarrow 3\text{Fe}(\text{OH})_3(\text{s}) + \text{Cr}(\text{OH})_4^-(\text{aq}) + \text{OH}^-(\text{aq})$
20	52a	$\text{Zn}(\text{s}) + 2\text{VO}^{2+}(\text{aq}) + 4\text{H}^+(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + 2\text{V}^{3+}(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
20	52b	$3\text{Zn}(\text{s}) + 2\text{VO}_3^-(\text{aq}) + 12\text{H}^+(\text{aq}) \rightarrow 3\text{Zn}^{2+}(\text{aq}) + 2\text{V}^{3+}(\text{aq}) + 6\text{H}_2\text{O}(\text{l})$
20	52c	$\text{Zn}(\text{s}) + \text{OCl}^-(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{Zn}(\text{OH})_2(\text{s}) + \text{Cl}^-(\text{aq})$
20	52d	$3\text{ClO}^-(\text{aq}) + 2\text{Cr}(\text{OH})_4^-(\text{aq}) + 2\text{OH}^-(\text{aq}) \rightarrow 3\text{Cl}^-(\text{aq}) + 2\text{CrO}_4^{2-}(\text{aq}) + 5\text{H}_2\text{O}(\text{l})$