Unit 6: Redox Reactions and Electrochemistry

Practice Set 3: Balancing Redox Reactions

- 1. Balance the following redox reactions using the oxidation number method.
 - a. $SnCl_2 + HgCl_2 \rightarrow SnCl_4 + HgCl$

initial	final	change		Coefficient	Total e ⁻
_	→		×	:	=
_	→		×	:	=

b. $HNO_3 + H_2S \rightarrow NO + S + H_2O$

initial	final	change	Coefficient	Total e ⁻
	\rightarrow		×	=
	\rightarrow		×	=

c. NaClO + $H_2S \rightarrow NaCl + H_2SO_4$

d. $CdS + I_2 + HCI \rightarrow CdCI_2 + HI + S$

Because one of the atoms undergoing oxidation or reduction has a subscript (I_2) we will account for the number of atoms of each element when preparing our summary chart:

	initial	final	change		no. atoms		No. e	Coefficient	Total e ⁻
I	- :	>		×	2 (in I ₂)			×	=
S	- ;	>				=		×	=

e. $I_2 + HNO_3 \rightarrow HIO_3 + NO_2 + H_2O$

initial	final	change	no. atoms	No. e ⁻	Coefficient	Total e ⁻
_	\rightarrow				×	=
-	\rightarrow		=		×	=

f. $MnO_4^- + H^+ + Cl^- \rightarrow Mn^{2+} + Cl_2 + H_2O$

initial	final	change	no. atoms	No. e ⁻	Coefficient	Total e ⁻
	>			×		=
_;	>			×		=

2.	Balance the following half-reactions for both atoms and electrons by adding the appropriate number of
	electrons to the correct side of the equation. Also identify each as either an oxidation or reduction.

a.
$$Pb^{2+} \rightarrow Pb$$

$$b. \quad Cl_2 \qquad \rightarrow \quad Cl^{\tilde{}}$$

c.
$$Fe^{3+} \rightarrow Fe^{2+}$$

d.
$$N_2O + H_2O \rightarrow NO + H^+$$

3. Break each equation into two half-reactions. Identify each half-reaction as oxidation or reduction.

a.
$$Cu + 2 H^{+} \rightarrow Cu^{2+} + H_{2}$$

b.
$$2 AI + 3 S \rightarrow AI_2S_3$$

- 4. Balance the following equations using the half-reaction method.
 - a. Na + $Br_2 \rightarrow NaBr$

Step 1	Step 2	Step 3
Write the two balanced half-	Balance for	Add the half-reactions, replacing any
reactions, removing any spectator ions:	electrons	spectator ions that were removed and/or recombining compounds
•		Ţ .
	added together:	
	_	
	reform compound:	

b. $Zn + S \rightarrow ZnS$

Step 1	Step 2	Step 3	
Write the two balanced half- reactions, removing any spectator ions:	Balance for electrons	Add the half-reactions, replacing any spectator ions that were removed and/recombining compounds	
		_	
	added together:		
	reform compound:		

c.
$$Ag + Cr_2O_7^{2-} + H^+ \rightarrow Ag^+ + Cr^{3+} + H_2O$$

For each half-reaction, remember to balance for atoms first, then add electrons to balance for charge.