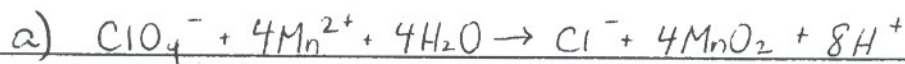
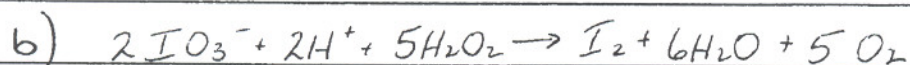


1. Balance the following equations by adding half-equations provided in Appendix D of the *Heath Chemistry* text. Then decide on the basis of the positions of the half-equations in the table whether or not the reaction may be expected to proceed.

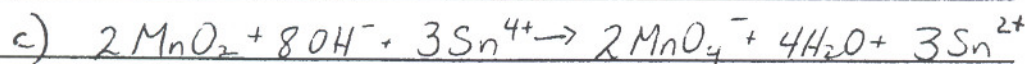
- a. $\text{ClO}_4^- + \text{Mn}^{2+} \rightarrow \text{Cl}^- + \text{MnO}_2$
 b. $\text{IO}_3^- + \text{H}_2\text{O}_2 \rightarrow \text{I}_2 + \text{O}_2$
 c. $\text{MnO}_2 + \text{Sn}^{4+} \rightarrow \text{MnO}_4^- + \text{Sn}^{2+}$
 d. $\text{NO}_3^- + \text{Br}_2 \rightarrow \text{NO} + \text{BrO}_3^-$



yes, proceeds



yes, proceeds

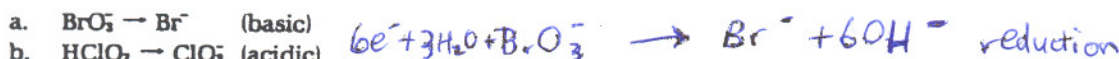


no, doesn't proceed



no, doesn't proceed.

2. Balance each of the following half-reactions, in either acidic or basic solution, as requested. Then state whether the process is oxidation or reduction.



3. Balance each of the following redox equations. Use either the half-reaction equation method or the oxidation number method.

- a. $\text{Cr}_2\text{O}_7^{2-} + \text{HNO}_2 \rightarrow \text{Cr}^{3+} + \text{NO}_3^-$ (acidic)
- b. $\text{IO}_3^- + \text{N}_2\text{O} \rightarrow \text{I}_2 + \text{NO}$ (acidic)
- c. $\text{MnO}_4^- + \text{Te} \rightarrow \text{MnO}_2 + \text{TeO}_3^{2-}$ * (basic)
- d. $\text{P}_4 + \text{NO}_2^- \rightarrow \text{H}_2\text{PO}_2^- + \text{N}_2\text{O}$ (basic)
- e. $\text{ClO}_4^- + \text{I}^- \rightarrow \text{Cl}^- + \text{IO}_3^-$ (acidic)
- f. $\text{IO}_4^- + \text{PH}_3 \rightarrow \text{I}^- + \text{P}_4$ (basic)
- g. $\text{C}_2\text{H}_5\text{OH} + \text{Cr}_2\text{O}_7^{2-} \rightarrow \text{CH}_3\text{COOH} + \text{Cr}^{3+}$ (acidic)
- h. $\text{MnO}_4^- + \text{CH}_3\text{CH}(\text{OH})\text{CH}_3 \rightarrow \text{Mn}^{2+} + \text{CH}_3\text{COCH}_3$ (acidic)
- i. $\text{HPO}_2^- \rightarrow \text{PO}_4^{3-} + \text{P}_4$ (basic)
- j. $\text{N}_2\text{O} \rightarrow \text{N}_2\text{H}_4 + \text{NO}_3^-$ (basic)

