

Name _____

Period _____

Partner _____

Date _____

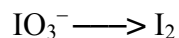
Oxidation-Reduction Survey

Pre-Lab Questions

1. Potassium iodate (KIO_3) is a strong oxidizing agent and will oxidize Fe^{2+} and Fe^{3+} ions. In doing so, iodate ion (IO_3^-) is reduced to elemental iodine (I_2).

(A) Use the oxidation state rules to assign oxidation states to the *iodine atom* in IO_3^- and I_2 .

(B) Complete and balance (in acid) the half-reaction for the reduction of iodate started below:



2. Write the oxidation half-reaction for Fe^{2+} .

3. Combine the two above half-reactions to write a balanced overall reaction Fe^{2+} of with IO_3^- .

Data Table A: Reactions of Iron(II) Ions with Oxidizing Agents

Well	Reactants	Observations (Initial Color)	Color After Adding KSCN
A1	$\text{Fe}^{2+}_{(\text{aq})}$		
A2	$\text{Fe}^{3+}_{(\text{aq})}$		
B1	$\text{Fe}^{2+} + \text{HCl} + \text{H}_2\text{O}_2$		
B2	$\text{Fe}^{2+} + \text{HCl} + \text{KMnO}_4$		
B3	$\text{Fe}^{2+} + \text{NaOCl}$		

Data Table B: Reactions of Iron(III) Ions with Reducing Agents

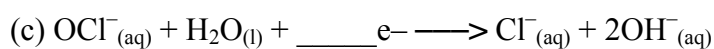
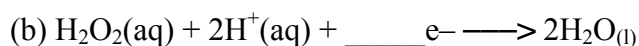
Well	Reactants	Observations (Initial Color)	Color After Adding $\text{K}_3\text{Fe}(\text{CN})_6$
C1	$\text{Fe}^{2+}_{(\text{aq})}$		
C2	$\text{Fe}^{3+}_{(\text{aq})}$		
D1	$\text{Fe}^{3+} + \text{HCl} + \text{Na}_2\text{SO}_3$		
D2	$\text{Fe}^{3+} + \text{NaBr}$		
D3	$\text{Fe}^{3+} + \text{NaI}$		
D4	$\text{Fe}^{3+} + \text{Vitamin C}$		
D5	$\text{Fe}^{3+} + \text{Pineapple Juice}$		

Post-Lab Questions

1. How can potassium thiocyanate be used to confirm that Fe^{2+} ions have been oxidized into Fe^{3+} ions?
2. Use the oxidation state rules to assign oxidation states from the indicated atoms in each oxidizing agent and its product (Part A)

Atom	Oxidizing Agent	Oxidation State	Product	Oxidation State
Mn	MnO_4^-		Mn^{2+}	
O	H_2O_2		H_2O	
Cl	OCl^-		Cl^-	

3. Fill in the blanks to show the number of electrons involved in each half-reaction.



4. Combine the oxidation half-reaction for Fe^{2+} with the appropriate half-reaction from Question 3 above and write the balanced chemical reaction for the overall redox reaction of Fe^{2+} with (a) permanganate ion, (b) hydrogen peroxide, and (c) hypochlorite ion.

5. How can potassium ferricyanide be used to confirm that Fe^{3+} ions have been reduced to Fe^{2+} ?
6. Based on the observations in Part B, which halide—bromide ion or iodide ion—is the stronger reducing agent? Explain.
7. Iron(II) compounds in food are more easily absorbed by the body than iron(III) compounds. Vitamin C improves the absorption of dietary iron. Explain this fact based on your observations in this experiment.
8. Suggest a possible reason for the results obtained using pineapple juice in this experiment.