

AP LAB 03b: REDOX Titration Simulations

Manganate(VII)/Fe²⁺ titration

1. Given that aqueous manganate(VII) (permanganate) ions will be converted to Mn²⁺_(aq) ions in acid solution, write a half equation to summarize this process.
2. Write a half equation to summarize the conversion of Fe²⁺_(aq) to Fe³⁺_(aq).
3. Combine the equations in #1 and #2 above to form a complete REDOX equation, and clearly identify the oxidizing agent and the reducing agent.
4. The REDOX titration computer simulation to accompany this LAB is located at www.chem.iastate.edu/group/Greenbowe/sections/projectfolder/flashfiles/redoxNew/redox.html

Go to the computer simulation and do the following;

- (a) Select the reaction: Choose KMnO₄. The buret will automatically fill with the selected oxidizing agent. The computer will automatically assign a molarity for the oxidizing agent.
 - (b) Use the slider to add a few mL of the oxidizing agent to the Fe²⁺ solution. Repeat this process until a slight pink "flash" of color is observed and then disappears. This is the signal that you are near the endpoint of the titration.
 - (c) Titrate to the end point. Getting the exact end point, requires great care (adding dropwise) and will be reached when there is a permanent pale pink color in the flask. Avoid adding too much oxidizing agent (dark purple) and having to start over.
5. Fill in the table below.

Molarity of oxidizing agent	
Volume of oxidizing agent added	
Volume of Fe ²⁺ solution	

6. Calculate the molarity of the Fe²⁺, enter this number (to three sig. figs) and click-on "OK". If you have done the titration accurately and correctly completed the calculation then you will have the correct answer. If NOT, then repeat the titration until the "Correct" message is seen.

I₂/Thiosulfate titration

- Given that aqueous thiosulfate (S₂O₃²⁻) ions will be converted to S₄O₆²⁻_(aq) ions in an oxidation, write a half equation to summarize this process.
- Write a half equation to summarize the conversion of Iodine to Iodide ions.
- Combine the equations in #7 and #8 above to form a complete REDOX equation, and clearly identify the oxidizing agent and the reducing agent.
- The REDOX titration computer simulation to accompany this LAB is located at www.chem.iastate.edu/group/Greenbowe/sections/projectfolder/flashfiles/redoxNew/redox.html

Go to the computer simulation and do the following;

- Select the reaction: Choose I₂. The buret will automatically fill with the thiosulfate solution. The computer will automatically assign a molarity for the Iodine solution.
 - Use the slider to add a few mL of the thiosulfate solution to the I₂ solution. Repeat this process until a blue color is observed. This is the signal that the starch indicator has been added and that you are near the endpoint of the titration.
 - Titrate to the end point. Getting the exact end point, requires great care (adding drop wise) and will be reached when there is no longer a blue color in the flask.
- Fill in the table below.

Molarity of the iodine solution	
Volume of iodine solution	
Volume of thiosulfate added	

- Calculate the molarity of the thiosulfate, enter this number (to three sig. figs) and click-on "OK". If you have done the titration accurately and correctly completed the calculation then you will have the correct answer. If NOT, then repeat the titration until the "Correct" message is seen.

Dichromate(VI)/Sn²⁺ titration

13. Given that aqueous dichromate ions will be converted to Cr³⁺_(aq) ions in an acid solution, write a half equation to summarize this process.
14. Write a half equation to summarize the conversion of aqueous Tin(II) ions to aqueous Tin(IV) ions.
15. Combine the equations in #13 and #14 above to form a complete REDOX equation, and clearly identify the oxidizing agent and the reducing agent.
16. The REDOX titration computer simulation to accompany this LAB is located at www.chem.iastate.edu/group/Greenbowe/sections/projectfolder/flashfiles/redoxNew/redox.html

Go to the computer simulation and do the following;

- Select the reaction: Choose K₂Cr₂O₇. The buret will automatically fill with the dichromate(VI) solution. The computer will automatically assign a molarity for the oxidizing agent.
 - Use the slider to add a few mL of the dichromate(VI) solution to the Sn²⁺ solution.
 - Titrate to the end point which is a pale green color. Getting the exact end point, requires great care (adding drop wise).
17. Fill in the table below.

Molarity of the dichromate(VI) solution	
Volume of dichromate(VI) solution added	
Volume of Sn ²⁺ solution	

18. Calculate the molarity of the Sn²⁺ solution and enter this number (to three sig. figs) and click-on "OK". If you have done the titration accurately and correctly completed the calculation then you will have the correct answer. If NOT, then repeat the titration until the "Correct" message is seen.