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AP LAB 04I: REDOX Titration Simulations

Manganate(VII)/Fe^{2+} titration

1. Given that aqueous manganate(VII) (permanganate) $MnO_4^-{}_{(aq)}$ ions will be converted to $Mn^{2+}{}_{(aq)}$ ions in acid solution, write a half equation to summarize this process.

2. Write a half equation to summarize the conversion of $Fe^{2+}{}_{(aq)}$ to $Fe^{3+}{}_{(aq)}$.

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. Download the simulation here; https://tinyurl.com/36suh572 and follow the instructions here to run it.

Go to the computer simulation and do the following;

(a) Select the reaction: Choose $KMnO_4$. 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 Fe^{2+} 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. If you overshoot the endpoint and get a DARK PURPLE color, simply press the REPEAT button, and you may start over.

(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/PURPLE color in the flask.

5. Fill in the table below.

Molarity of the $KMnO_4$ (oxidizing agent)	
Volume of the $KMnO_4$ (oxidizing agent) added	
Volume of Fe^{2+} solution (reducing agent)	

6. Calculate the molarity of the Fe^{2+}, 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.

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I_2/Thiosulfate titration

7. Given that aqueous thiosulfate $S_2O_3^{2-}{}_{(aq)}$ ions will be converted to $S_4O_6^{2-}{}_{(aq)}$ ions in an oxidation, write a half equation to summarize this process.

8. Write a half equation to summarize the conversion of iodine I_2 to iodide I^- ions.

9. Combine the equations in #7 and #8 above to form a complete REDOX equation, and clearly identify the oxidizing agent and the reducing agent.

10. Download the simulation here; https://tinyurl.com/36suh572 and follow the instructions here to run it.

Go to the computer simulation and do the following;

(a) Select the reaction: Choose I_2. The buret will automatically fill with the thiosulfate solution. The computer will automatically assign a molarity for the Iodine solution.

(b) Use the slider to add a few mL of the thiosulfate solution to the I_2 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.

(c) 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.

11. Fill in the table below.

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

12. 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.

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Dichromate(VI)/Sn^{2+} titration

13. Given that aqueous dichromate(VI) $Cr_2O_7^{2-}{}_{(aq)}$ ions will be converted to $Cr^{3+}{}_{(aq)}$ 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. Download the simulation here; https://tinyurl.com/36suh572 and follow the instructions here to run it.

Go to the computer simulation and do the following;

(a) Select the reaction: Choose $K_2Cr_2O_7$. The buret will automatically fill with the dichromate(VI) solution. The computer will automatically assign a molarity for the oxidizing agent.

(b) Use the slider to add a few mL of the dichromate(VI) solution to the Sn^{2+} solution.

(c) 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 Sn^{2+} 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.