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Synthesis and Analysis of Ammonium Decavanadate, (NH₄)₆V₁₀O₂₈•6H₂O

Data

Synthesis of $(NH_4)_6 V_{10}O_{28} \bullet 6H_2O$	
Mass of NH ₄ VO ₃	
Moles of NH ₄ VO ₃	
Mass of $(NH_4)_6 V_{10}O_{28}\bullet 6H_2O$	
Theoretical Yield	
Percent Yield	

UV-Vis Analysis of (NH₄)₆V₁₀O₂₈•6H₂O

Solution (Decavanadate: H ₂ O)	Concentration (M)	Absorbance
1:4		
2:3		
3:2		
4:1		
5:0		
My solution B		

Append a Beer's Law plot of your results with a best-fit line with equation and goodness of fit, and 'my solution B' data point clearly labeled.

Grams of $(NH_4)_6V_{10}O_{28}$ •6H ₂ O used to make first solution	
Concentration of vanadium in my solution B	
Moles of vanadium in my solution B	
Moles of vanadium in solution A	
Grams vanadium in solution A	
Experimental percent vanadium in $(NH_4)_c V_{10} O_{22} \bullet 6H_2 O_{22}$	
Experimental percent vanadium in $(NH_{2})_{0} V_{10} O_{28} O_{12} O_{28}$	
Demoent error	
reicent error	

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Permanganate Titration of $(NH_4)_6V_{10}O_{28}\bullet 6H_2O$

Mass of oxalic acid dihydrate $(H_2C_2O_4 \cdot 2H_2O)$

Moles of oxalic acid dihydrate

Molarity of standard oxalic acid solution

	Titration #1	Titration #2	Titration #3
Vol. std. oxalic acid			
Moles oxalic acid			
Moles permanganate			
KMnO ₄ : initial mL			
KMnO ₄ : final mL			
Vol. permanganate			
KMnO ₄ Molarity			

Average KMnO₄ Molarity

	Titration #1	Titration #2	Titration #3
Vol. vanadium sol'n			
KMnO ₄ : initial mL			
KMnO ₄ : final mL			
Vol. permanganate			
Moles permanganate			
Moles vanadium			

Average moles vanadium

Moles vanadium in whole (100. mL) titration solution

Mass vanadium in titration solution

Mass of $(NH_4)_6V_{10}O_{28}$ •6H₂O used to make titration solution

Experimental percent vanadium in $(NH_4)_6V_{10}O_{28}\bullet 6H_2O$

Theoretical percent vanadium in $(NH_4)_6V_{10}O_{28}$ •6H₂O

Percent error

Append calculations for all work presented here.

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IR Analysis

Report observed bands to the nearest whole wavenumber (cm⁻¹). Refer to standard IR spectra of ammonium metavanadate and acetic acid provided, and your IR spectrum of your product, $(NH_4)_6V_{10}O_{28}$ •6H₂O.

Assignment	cm ⁻¹ in NH ₄ VO ₃	cm ⁻¹ in CH ₃ CO ₂ H	cm^{-1} in (NH ₄) ₆ V ₁₀ O ₂₈ •6H ₂ O
νО-Н			
vN-H			
vN-H			
vN-H			
vC-H			
vC=O			
δС-Н			
δN-H			
vC-O			
vV-0			
vV-0			
vV-0			

Legend: $v = \text{ stretch}, \delta = \text{bend}$

Thought Questions

1. Describe color changes observed during this laboratory experiment. State the chemical identities of the various colored components.

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2. Reflect on your percent yield. Discuss any errors or observations that would help you explain why it is not 100%.

3. Is there any evidence of acetic acid in your product? Present evidence. Discuss how this would impact your quantitative measures of product purity.

4. Based on your results, how pure is your product? Do the two determinations of purity agree? Why or why not? If your product is impure, discuss possible reasons why.