Pre-Lab

09.27.2021

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Purpose

To determine the percentage and molarity of H_2O_2 in ordinary over-the-counter solutions of hydrogen peroxide by tritating a solution of 0.02 M $KMnO_4$ into a measured amount of an unknown concentration of hydrogen peroxide, $H_2O_2.$

Lab Variables

Independant - solution of 0.02 M $KMnO_4$ Dependent - concentration of H_2O_2

Lab Safety Considerations

H_2O_2→ can cause fire, permanent eye damage, eye and skin irritation or burns, severe digestive tract irritation , and blood abnormalities
$KMnO_4$→ can cause fire, severe eye and skin irritation or burns, can cause respiratory tract irritation and possible burns, and severe digestive tract irritation and possible burns
H_2SO_4→ causes eye and skin burns, digestive and respiratory tract burns, may be fatal if mist is inhaled, can cause cancer, reacts violently with water and other substances. May cause lung damage, absorbs moisture from air, and corrosive to metal.
H_2O→ non-hazardous

Materials

- 1 burrets
- Erlenmeyer flasks
- Stir plate
- Magnetic stir bar or self stir
- Balance
- Household hydrogen peroxide
- $0.02M$ potassium permanganate solution
- $3.0M$ sulfuric acid
- $0.1M$ manganese(II) sulfate
- Distilled water

Procedures

1. Obtain and wear goggles.
2. Rinse and fill a buret with standardized $KMnO_4$ solution. Record the molarity of thesolution.
3. Determine the mass of a clean, dry Erlenmeyer flask to the correct number ofsignificant figures, and record.

4. From the buret on the front table, record the initial volume (again, to the correct number of significant figures). Add approximately $1.5 mL$ of ordinary householdhydrogen peroxide. Record the final buret volume.
5. Find the mass of the flask with the peroxide and record.
6. Add about $35 mL$ of distilled water, $5 mL$ of 3.0 M $H2SO_4$, and 3 or 4 drops of 0.1 MMnSO4, which acts as a catalyst.
7. Record the volume in your $KMnO_4$ buret, and titrate your sample to a pale pink end point
8. Calculate the percentage of H_2O_2 in the original sample
9. Repeat titration if possibleat least tw to three times for consistent results.

Theoretical Yield

Pre-lab Questions

$\text{MnO}_4^{-} + 5\text{H}_2\text{O}_2 \rightarrow \text{Mn}^{+2} + 4\text{H}_2\text{O} + 5\text{O}_2+ 2\text{H}^{+}$

1. 5 electrons are transferred
2. Magnesium(Mn) is oxidized while Oxygen(O) is reduced