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Preparation of Ferrous Sulphate

Experiment 8 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare ferrous sulphate crystals and explain oxidation control and the heptahydrate yield basis.

Principle

Iron reacts with suitable dilute sulphuric acid to form FeSO_4 and hydrogen. Ferrous iron can oxidise to ferric iron on exposure. Crystallisation commonly gives $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$, so yield calculations must specify the hydrate.

Requirements

- Prescribed iron material, dilute sulphuric acid and water.
- Instructor-supervised ventilated reaction setup, beakers, filtration, cooling and balance.

Procedure

1. Calculate

Use the assigned iron amount and identify the limiting reactant. Write the target hydrate formula.

2. Observe reaction

Under the prescribed supervised procedure, react iron with the specified dilute acid. Keep the gas-evolving system unsealed and away from ignition sources.

3. Clarify

Separate residual solid iron or insoluble material as directed. Keep the solution under the prescribed conditions that limit oxidation.

4. Crystallise

Concentrate and cool by the assigned method to form crystals without uncontrolled overheating.

5. Collect and assess

Separate and surface-dry as prescribed. Record pale-green appearance, any yellow-brown material and the mass on the stated hydrate basis.

Observations and Record

Item	Observation / value	Record
Reaction	Gas evolution and completion	_____
Crystals	Colour and appearance	_____
Mass / yield	Hydrate basis	___ g / ___%

Pharmaceutical Inorganic and Analytical Chemistry

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Reaction: $\text{Fe} + \text{H}_2\text{SO}_4 \rightarrow \text{FeSO}_4 + \text{H}_2$.
- Ideal example: 1.00 g Fe = $1.00/55.85$ mol. Theoretical $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ = $(1.00/55.85) \times 278.01 \approx 4.98$ g.
- Recovered 4.50 g on the heptahydrate basis gives approximately 90.4% yield. Surface water or a different hydrate invalidates this simple calculation.

Result

Crystals were obtained with appearance _____. Recovered mass = ____ g on the ____ hydrate basis; yield = ____%.

Precautions

- Hydrogen evolution requires the prescribed ventilation and absence of ignition sources.
- Do not seal the reacting vessel or use a direct flame.
- Limit oxidation and record discolouration instead of assuming all recovered material is Fe(II) salt.

Viva Questions and Answers

1. Why is hydrogen produced?

Iron displaces hydrogen from the suitable acid reaction.

2. Why can colour change on storage?

Ferrous material can oxidise and form ferric-related products.

3. Why use 278.01 g/mol in the example?

The yield is expressed as $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$, not anhydrous FeSO_4 .

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