



Oxford Cambridge and RSA

Thursday 23 June 2022 – Morning

A Level Chemistry B (Salters)

H433/03 Practical skills in chemistry

Practical Insert

Time allowed: 1 hour 30 minutes



INSTRUCTIONS

- Do **not** send this Insert for marking. Keep it in the centre or recycle it.

INFORMATION

- This document has **4** pages.

Determination of the percentage of copper present in brass.

Brass is an alloy of copper and zinc. The proportions of each metal depend on what the brass is being used for.

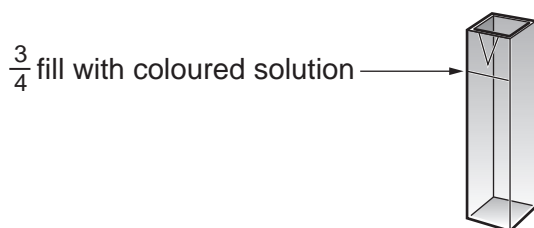
A group of students use colorimetry to determine the percentage of copper present in a sample of a brass.

The students' description of their method along with their results is shown below.

Constructing a calibration graph

1. A variety of standard copper(II) nitrate solutions (see results table) were made from an initial standard solution of concentration $0.400 \text{ mol dm}^{-3}$.
2. An orange filter was placed in the colorimeter.
3. A cuvette was rinsed and $\frac{3}{4}$ filled with deionised water. The outside of the cuvette (see diagram below) was wiped dry with a paper tissue and placed in the colorimeter. The absorbance reading was adjusted until it read zero.
4. The deionised water was discarded and the cuvette $\frac{3}{4}$ filled with the first solution of known concentration ($0.025 \text{ mol dm}^{-3}$). The absorbance was measured and recorded in the results table.
5. The cuvette was again rinsed with deionised water and step 4 repeated for all the standard solutions. Their absorbance values were recorded in the results table.

A graph of absorbance against concentration can now be constructed.



The cuvette that holds the solution in the colorimeter

Preparation and measurement of the absorbance of a solution of the brass sample

1. Approximately 4 g of the brass sample were weighed accurately.
2. This mass of brass was dissolved in a minimum amount of concentrated nitric acid in a conical flask in a fume cupboard and the solution allowed to cool. The resultant solution was then carefully transferred to a 250 cm³ volumetric flask and made up to the mark with deionised water.
3. Using a teat pipette, the cuvette used for constructing the calibration graph was rinsed with the brass solution, $\frac{3}{4}$ filled, and its absorbance measured.
This was compared with the standard solutions to determine the copper concentration.

Results

| Concentration of copper(II) nitrate solution/mol dm⁻³ | Absorbance |
|---|-------------------|
| 0.025 | 0.05 |
| 0.050 | 0.12 |
| 0.100 | 0.25 |
| 0.200 | 0.40 |
| 0.300 | 0.72 |
| 0.400 | 1.03 |

Mass of brass sample dissolved = 4.04 g

Absorbance of brass solution = 0.44

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