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**

*910294820*

**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 mol $dm^{-3}$.

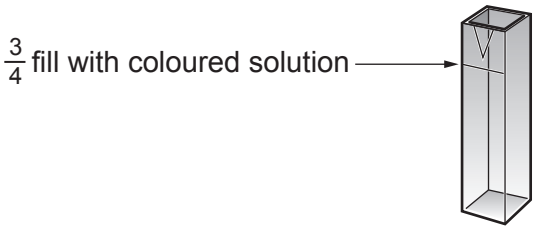
2. An orange filter was placed in the colorimeter.

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 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 $cm^3$ 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