Holiday homework Y12 Chemistry

Investigating the copper content of brass screws

Introduction

Brass is an alloy containing copper. You will plan how to determine the copper content in a sample of brass.

One method of finding the concentration of Cu^{2+} ions in a solution is titration using sodium thiosulfate, $Na_2S_2O_3(aq)$.

Aims *and Skills*

- to determine the copper content in a sample of brass
- *to research and report information in order to plan a short investigation.*

You will also be provided with

- a standard solution of sodium thiosulfate, $Na_2S_2O_3$, 0.100 mol dm^{-3}
- a standard solution of potassium iodide, KI(aq), 0.500 mol dm^{-3}
- a starch solution.

Equipment

Your research will help you decide which pieces of laboratory apparatus you will need.

Health & Safety

Before beginning the procedure, you must complete a risk assessment as part of your research and planning.

You should:

- **identify the hazard information and precautions for the chemicals you will be using and producing – use CLEAPSS resources (e.g. Student Safety Sheets) or similar**
- **consider the actions you will take during the procedure**
- **plan the precautions you will take to minimise the risk.**

Procedure

Research

First of all you will need to carry out some research to find out about brass and how to analyse it. You should consult both on-line and off-line sources and include an appropriate reference to each source in your written account.

Use your research to write an introduction in which you cover the following points. Ensure you correctly cite all of your sources of information.

- What metals are in different types of brass?
- What is the approximate proportion of copper present in a typical sample of brass?
- Details about a titration method using aqueous sodium thiosulfate, $Na_2S_2O_3(aq)$ that can be used to find the concentration of Cu^{2+} ions in a solution.
- How to detect the end-point of the titration. On-line videos are useful here for providing guidance.

- How to convert copper in brass into a neutral solution containing $Cu^{2+}(aq)$ ions suitable for the titration.
- The chemistry on which this analysis of brass is based.

Planning

Create a plan for how you will determine the exact percentage by mass of copper in a sample of brass. Give full experimental details, including:

- quantities needed
- concentrations of solutions
- size of apparatus
- steps to be carried out
- a risk assessment to cover the chemicals that you plan to use.

You should be able to justify your choices.

Write down your plan in sufficient detail so that another chemistry student could follow and use it.

Extension: Research careers in science- not just medicine as you know it.
https://www.careerpilot.org.uk/job-sectors/subject/chemistry