

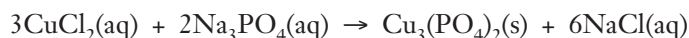
Precipitation of Aqueous Copper Compounds

Introduction

Aqueous copper can interfere with the functioning of municipal water treatment systems and should not be poured down the drain. The copper must be precipitated from the solution and disposed of separately.

Background

Copper compounds in a solution react with sodium phosphate to form copper(II) phosphate.



Copper phosphate precipitates can be filtered from the solution and disposed of in the trash.

Materials

Sodium phosphate, tribasic, $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$

Chemical-resistant apron

Chemical-resistant gloves

Chemical splash goggles

Beaker, glass, large

Filtration apparatus

Magnetic stirrer/hot plate with stir bar (optional)

Stirring rod, glass

Safety Precautions

Wear chemical splash goggles, chemical-resistant gloves and chemical-resistant apron. Wash hands thoroughly with soap and water before leaving the laboratory. Follow all laboratory safety guidelines. Please review current Material Safety Data Sheets for additional safety, handling, and disposal information.

Procedure

1. Add a 2x molar excess of sodium phosphate to the copper solution and stir for complete mixing. A turquoise precipitate forms (see Figure 1).

Sodium phosphate is found commercially as sodium phosphate tribasic (sodium phosphate dodecahydrate) with formula weight 380.12 g/mole. The following sample calculation demonstrates the relative amounts needed to perform the procedure effectively. For example, each liter (L) of 0.10 M solution of aqueous copper solution needs approximately 51 g of $\text{Na}_3\text{PO}_4(\text{s})$.

$$0.10 \text{ mole Cu compound} \times \frac{2 \text{ mole } \text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}}{3 \text{ mole copper compound}} = 0.067 \text{ moles of } \text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$$

For a 2x molar excess solution, 0.134 moles of $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ are needed.

$$0.134 \text{ moles of } \text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O} \times \frac{380.12 \text{ g } \text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}}{1 \text{ mole } \text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}} = 51 \text{ g } \text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$$

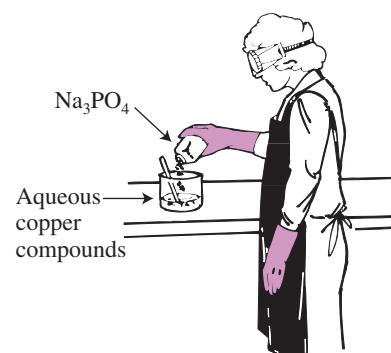


Figure 1.

Precipitation of Aqueous Copper Compounds *continued*

2. Filter the resulting precipitate of copper(II) phosphate (see Figure 2).
3. Allow the precipitate to dry and dispose of it in a landfill approved for such wastes (see Figure 3).
4. Flush the filtrate down the drain with a large (at least 20-fold) excess of water (see Figure 4).

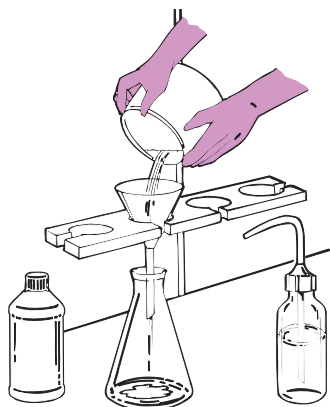


Figure 2.

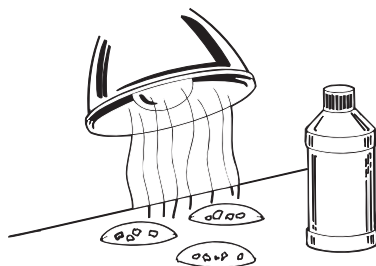


Figure 3.

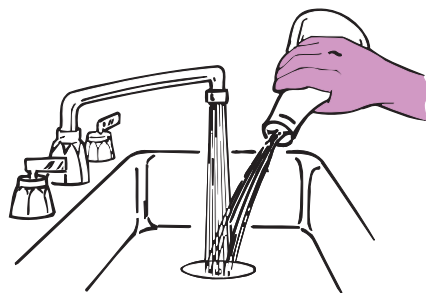


Figure 4.

Disposal

Please read the general guidelines governing the disposal of laboratory waste found in the reference article entitled “Laboratory Waste Disposal” in your current Flinn Scientific Catalog/Reference Manual.

Tips

- Consult with local regulatory officials before treatment of chemical waste. Act responsibly with respect to all governing laws and regulation, remembering these procedures are only intended for small quantities. Only attempt chemical procedures with the full knowledge of all materials involved and when 100% comfortable with the method.
- Wherever possible, treatment of laboratory waste solutions should always be incorporated into the laboratory procedure itself at the conclusion of an experiment or demonstration.

Materials for *Precipitation of Aqueous Copper Compounds* are available from Flinn Scientific, Inc.

Catalog No.	Description
S0101	Sodium Phosphate, Tribasic

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.