For Teachers

Separation of copper and iron – two approaches

Module 1

Objective: Precipitation and Leaching

Necessities

Reagents	Formula	!	Quantity (g) or Concentration (M)
Iron (II) sulfate heptahydrate	$FeSO_4 \times 7\ H_2O$	GHS 05, GHS 07	c = 0,14 mol x L^{-1}
Copper (II) sulfate pentahydrate	$CuSO_4 \times 5\ H_2O$	GHS 07, GHS 09	c = 0,13 mol x L^{-1}
Sodium hydroxide solution	Na OH	GHS 05	c = 10 %
Ammonia solution	NH_4OH	GHS 05, GHS 07, GHS 09	c = 25 %

List of materials/tools

- Test tubes
- Glass funnel
- Test tubes
- Test tube holder

Procedure

Preparation of stock solutions

Please prepare the stock solutions A to C as described below.

A) Weigh 0,014 mol $FeSO_4 \times 7\ H_2O$, place it in a 100 mL volumetric flask and add approximately half of the flask's volume of distilled water. Shake the closed flask thoroughly to dissolve the salt. Add distilled water to the clear solution until the marking of the flask is reached. Then mix well again.

B) Weigh 0,013 mol $CuSO_4 \times 5\ H_2O$ and proceed like described above.

C) To prepare the combined solution please weigh 0,014 mol $FeSO_4 \times 7\ H_2O$ and 0,013 mol $CuSO_4 \times 5\ H_2O$, place both in a flask and dissolve the combined salt portions as described in A.

Label the stock solutions with the letters A to C.

Experimental procedure

Place a sample of the solution A and B in separate test tubes (approx. two cm high). Now add sodium hydroxide solution dropwise with a pipette to both of the test tube. Now filter the contentof the test tubes. Collect the residue on the filter papers in fresh test tubes and add ammonia solution dropwise with a pipette.

Now place a sample of solution C in a fresh test tube and repeat the steps mentioned above.
In this experiment, the principle of metal separation through a sequence of precipitation and leaching steps is illustrated with a mixture of iron and copper salts. Generally iron and copper can be separated by altering the pH-value of an aqueous solution due to the different but in both cases high dependency of the solubility on the pH-value .

Conclusions

- Solubility
- Reaction equations
- Qualitative analysis