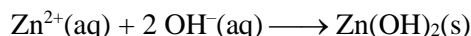
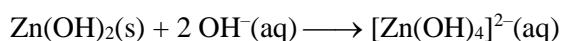


Preparation of zinc oxide

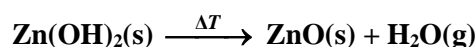
Zinc oxide is formed by burning zinc in oxygen atmosphere or by dehydration of zinc hydroxide. Both ZnO and Zn(OH)₂ are amphoteric substances. They dissolve in acids forming zinc salts as well as in alkali hydroxide solutions forming trihydroxido and/or tetrahydroxidozincates. Zinc oxide is shiny white solid substance used in pharmaceutical industry and in the production of milky white glass, special types of paper, cosmetics, and white paints. In the laboratory it may be prepared by thermal decomposition of zinc hydroxide. Zinc hydroxide is commonly prepared by precipitation reaction of zinc salt solution and sodium hydroxide.



In the excess of hydroxide anions zinc hydroxide dissolves forming tetrahydroxidozincate anions, according to the reaction



When heated, zinc hydroxide decomposes to white zinc oxide and water vapour.



Work

Prepare zinc hydroxide by the thermal decomposition of zinc hydroxide.

Chemicals

- zinc sulphate solution, the by-product in the cementation of copper,
- sodium hydroxide, white solid substance.

Procedure

Filter the zinc sulphate solution, which is the by-product in the cementation of copper. Add in small portions the calculated amount of 5 wt% sodium hydroxide solution. Let settle the precipitation formed and then add a few drops of hydroxide solution. If no more precipitation is formed, the reaction is finished. Do not add more hydroxide solution than necessary, otherwise precipitate dissolves again.

Filter out the white precipitate of zinc hydroxide using Büchner funnel, wash it twice with *cca* 20 cm³ of cold water to remove last traces of sodium sulphate. Stir the mixture carefully with a glass rod to prevent wet filter from rupture. Dry the precipitate in the Büchner funnel by air flow.

Put the dried precipitate to a ceramic crucible on the pipeclay triangle. First heat the crucible with moderate flame. When last traces of water evaporate, anneal the precipitate in the crucible by strong flame for *cca* 15 minutes. Then weigh the prepared zinc oxide.

Safety instructions

Zinc(II) sulfate heptahydrate – ZnSO₄ · 7H₂O

- R36/38** Irritating to eyes and skin.
- R50/53** Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- S22** Do not breathe dust.
- S25** Avoid contact with eyes.
- S60** This material and its container must be disposed of as hazardous waste.
- S61** Avoid release to the environment. Refer to special instructions/safety data sheet.

Sodium hydroxide – NaOH

- R34** Causes burns.
- S26** In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S28** After contact with skin, wash immediately with plenty of (to be specified by the manufacturer).
- S45** In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).
- S36/37/39** Wear suitable protective clothing, gloves and eye/face protection.

Sodium sulfate heptahydrate – Na₂SO₄ · 10H₂O

- R36/37/38** Irritating to eyes, respiratory system and skin.
- S36** Wear suitable protective clothing.
- S37/39** Wear suitable gloves and eye/face protection.

Zinc(II) hydroxide – Zn(OH)₂

- R20** Harmful by inhalation.
- R36/37/38** Irritating to eyes, respiratory system and skin.
- S36** Wear suitable protective clothing.

Zinc(II) oxide – ZnO

- R20** Harmful by inhalation.
- S22** Do not breathe dust.
- S38** In case of insufficient ventilation wear suitable respiratory equipment.
- S36/37/39** Wear suitable protective clothing, gloves and eye/face protection.