

Classification of inorganic compounds

Experiment 1

Preparation and properties of sulfur dioxide

Laboratory equipment:

- flat-bottomed flask
- combustion metal spoon
- burner

Chemicals:

- sulfur
- BBT indicator
- magnesium turnings

Pour approximately 20 cm³ of tap water (half of volume of the flask) and four drops of BBT indicator into a flask. The solution has a blue-greenish color. Put small amount of sulfur on a spoon and heat it over a burner. The sulphur melts at 260 °C and ignites. After the ignition, lower the spoon into a flask just above the water surface. After the sulfur has burnt out and white smog appears, take the spoon out, cork the flask up and shake it. Then observe the change of color of the indicator into yellow. Put a little amount of magnesium chips into the flask. Then observe the reaction and the evaluation of hydrogen.

Experiment 2

Preparation and properties of carbon dioxide

Laboratory equipment:

- 2 conical flasks with a stopper
- bent pipe (U-shaped) in stopper

Chemicals:

- crystalline CaCO₃
- BBT indicator
- 1 M HCl

Place a few crystals of calcium carbonate inside a conical flask, add approximately 10 cm³ of salt acid HCl and few droplets of BBT indicator. Pour $\frac{3}{4}$ volume of tap water into the second flask, add few droplets of BBT. Close the first flask with a stopper with an outlet pipe. Put the other end of the pipe into a flask with water. Emitted carbon dioxide bubbles partially dissolve in the water forming carboxylic acid. Observe the change of color of BBT indicator.

Experiment 3

Preparation and properties of magnesium oxide

Laboratory equipment:

- 3 test tubes in a rack
- iron plate
- gas burner

Chemicals:

- magnesium turnings
- phenolphthalein indicator
- 2M H₂SO₄
- 2M NaOH

Put a few magnesium turnings (approximately 0.5g) on an iron plate and heat them up over the burner (a strongly exothermic reaction). Put the magnesium oxide formed during the reaction into a test-tube with

approximately 5 cm³ of distilled water and add two drops of phenolphthalein. The indicator changes its color from colorless to raspberry. Pour the solution, without the sediment, into two test-tubes. Add 2 cm³ of 2 M sulfuric acid H₂SO₄ solution to one first test tube, and approximately 2 cm³ of 2M sodium hydroxide NaOH to the other one. Observe the change of the indicator's color.

Experiment 4.

Preparation of hydroxides in course of precipitation reaction

Laboratory equipment:

- 4 test tubes in a rack

Chemicals:

- NaOH solution

- Ba(NO₃)₂

- CuSO₄

- FeCl₃

- NiSO₄,

- Co(NO₃)₂

Pour approximately 2 cm³ of each salt: barium nitrate, copper (II) sulfate, iron (III) chloride (ferric chloride), nickel (II) sulfate into four test tubes. Add approximately 2 cm³ of sodium hydroxide NaOH to each one. Observe the reactions and notice the colors of forming hydroxides.

Experiment 5.

The amphoteric properties of stannous hydroxide

Laboratory equipment:

- 2 test tubes in a rack

Chemicals:

- SnCl₂

- NaOH

- HCl

Pour to the tube approximately 0.5 cm³ of tin (II) chloride (stannous chloride) solution of and carefully add dropwise 2M sodium hydroxide NaOH until a white precipitate appears. Split the precipitate into two test tubes. Then add slowly 2M HCl to the first one test tube until precipitate dissolves. Repeat the same in the second test tube by adding 2M sodium hydroxide NaOH. Dissolution of tin (II) hydroxide (stannous hydroxide) Sn(OH)₂ in both acidic and alkaline environment indicates amphotericity of tin (II) compounds.

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Stage	Course of the reaction	product name	obserations, conclusions
Experiment 1. Preparation and properties of sulfur dioxide			
1. Spalanie siarki	$S + O_2 = SO_2$	sulfur dioxide	evolution of gas with a pungent odor
2.	$SO_2 + H_2O =$		
3.	$Mg + H_2SO_3 =$		
Experiment 2. Preparation and properties of carbon dioxide			
1.	$CaCO_3 + HCl =$		
2.	$CO_2 + H_2O =$		
Experiment 3. Preparation and properties of magnesium oxide			
1.	$Mg + O_2 =$		
2.	$MgO + H_2O =$		
3.	$Mg(OH)_2 + H_2SO_4 =$		
4.	$Mg(OH)_2 + NaOH =$		
Experiment 4. Preparation of hydroxides in course of precipitation reaction			
1.	$Ba(NO_3)_2 + NaOH =$		
2.	$CuSO_4 + NaOH =$		
3.	$FeCl_3 + NaOH =$		
4.	$NiSO_4 + NaOH =$		
5.	$Co(NO_3)_2 + NaOH =$		
Experiment 5. The amphoteric properties of stannous hydroxide			
1.	$SnCl_2 + NaOH =$		
2.	$Sn(OH)_2 + NaOH =$		
3.	$Sn(OH)_2 + HCl =$		