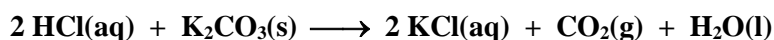


## Preparation of potassium chloride

Potassium chloride is white crystalline. It has NaCl-type structure – each potassium atom is surrounded by six chlorine atoms and *vice versa*. From the saturated solution crystallizes in cubes, often together with octahedrons. Potassium chloride can be prepared by the protolytic and gas-exclusion reaction of hydrochloric acid with potassium carbonate, *i. e.* by displacement of weak (carbonic) acid by stronger (hydrochloric) acid.



Because potassium carbonate is hygroscopic, the limiting reagent must be hydrochloric acid. On the other hand, hydrochloric acid is very volatile, therefore to use calculated amount, its density must be determined before the experiment.

### Work

Prepare 0,2 mol of potassium chloride by the protolytic reaction of potassium carbonate with hydrochloric acid.

### Chemicals

- hydrochloric acid, HCl, concentrated,  $w(\text{HCl}) = 0,36$
- potassium carbonate,  $\text{K}_2\text{CO}_3$ , white crystalline

### Procedure

Pour calculated volume of hydrochloric acid into a higher beaker. Add calculated volume of water to prepare the saturated solution of KCl at 50 °C. stir the solution shortly and add calculated amount of  $\text{K}_2\text{CO}_3$  in small portions. After each portion cover the beaker with a watch glass to prevent the solution from bubbling up from the beaker. When entire carbonate is added, heat the solution to the boiling point to exclude dissolved carbon dioxide. Put one drop of the solution with a glass rod on the litmus paper to check the pH. If the solution is still acidic, add another small portion of carbonate until slightly basic. Then boil the solution for a while to precipitate insoluble metal hydroxides ( $\text{Fe}^{\text{III}}$  and  $\text{Al}^{\text{III}}$ ) and let it stay few minutes until precipitate coagulates (changes to cloudy floating substance). Filter the solution using a fluted filter to an evaporating dish and heat it over a water bath until saturated. Do not forget to measure the temperature of the saturated solution in the evaporating dish. After cooling to room temperature filter out the shiny white crystals of KCl on the Büchner funnel and put them to an oven to dry them up.

### Safety instructions

#### Hydrochloric acid – HCl

- R34** Causes burns.
- R37** Irritating to respiratory system.
- S2** Keep out of the reach of children
- S26** In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

#### Potassium carbonate – $\text{K}_2\text{CO}_3$

- R22** Harmful if swallowed.
- R36/37/38** Irritating to eyes, respiratory system and skin.
- S22** Do not breathe dust
- S28** After contact with skin, wash immediately with plenty of (to be specified by the manufacturer)

#### Potassium chloride – KCl

- R36/37/38** Irritating to eyes, respiratory system and skin.
- S26** In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
- S36** Wear suitable protective clothing