

Preparation of p-toluenesulfonic acid

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Principle

This experiment examins the formation of p-tolune-sulfonic acid. The sulfonation of toluene with concentrated sulfuric acid is an electrophilic aromatic substitution. This means, the sulphonation of toluene is an electrophilic substitution at the aromatic compound. The sulphonating reagents can be the free sulphur trioxide or the HSO3+ cation, which is present in the concentrated sulphuric acid in equilibrium. Unlike most other electrophilic substitutions, sulphonation is a reversible reaction. If water is present at higher temperatures, hydrolysis is mostly successful. In order to displace the equilibrium towards the desired product, the generated water must be bound or removed from the reaction mixture by way of azeotropic distillation

Benefits

- Controlled and safe heating via heating mantle and power regulator
- Secure connection of the items by GL screw joint system

Tasks

• Prepare p-Toluenesulphonic acid from toluene and concentrated sulphuric acid.

Learning objectives

- · electrophilic aromatic substitution
- sulphonation is a reversible reaction
- azeotropic distillation







Scope of delivery

Support rod, stainless steel, different lenghts 02037-00 2 Retort stand, h = 750 mm 37694-00 1 Right angle boss-head clamp 37697-00 3 Universal clamp 37715-01 3 Round bottom flask, 100ml, GL 25/12 MALI-27100001 1 Water separator GL25/12 35790-15 1 Dimroth-Condensor, GL 25/12 MALI-27223500 1 Graduated cylinder, Borosilicate, 1000 ml 36629-00 1 Beaker, Boro, high-form 46032-00 1 Beaker, Boro, high-form 46027-00 1 Buchner funnel, i.d. = 70, porcelain 32707-00 1 Round filter, different sizes 32977-02 1 Filter flask, 500ml, PN 34-5 34419-01 1 Rubber gaskets, conical, set of 8 39265-00 1 Water jet pump, plastic 02728-00 1 Porcelain dish 25ml, d 50mm 34457-00 1 Heating mantle f. roundbottom flask, 100 ml 49541-93 1 Clamp for heating mantle 49557-01 1 Power reg	Support base DEMO	02007-55	1
Right angle boss-head clamp 37697-00 3 Universal clamp 37715-01 3 Round bottom flask, 100ml, GL 25/12 MAU-27100001 1 Water separator GL25/12 35790-15 1 Dimroth-Condensor, GL 25/12 MAU-27223500 1 Graduated cylinder, Borosilicate, 1000 ml 36629-00 1 Beaker, Boro, high-form 46032-00 1 Beaker, Boro, high-form 46027-00 1 Buchner funnel, i.d. = 70, porcelain 32707-00 1 Round filter, different sizes 32977-02 1 Filter flask, 500ml, PN 34-5 34419-01 1 Rubber gaskets, conical, set of 8 39265-00 1 Water jet pump, plastic 02728-00 1 Porcelain dish 25ml, d 50mm 32516-00 1 Funnel, glass, top dia, 50 mm 34457-00 1 Heating mantle f. roundbottom flask, 100 ml 49541-93 1 Clamp for heating mantle 49557-01 1 Power regulator 32288-93 1 Desiccator, vacuum, diam. 150 mm 34126-00 1 Rubber hose 392	Support rod, stainless steel, different lenghts	02037-00	2
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Clamp for heating mantle 49557-01 1 Power regulator 32288-93 1 Desiccator, vacuum, diam. 150 mm 34126-00 1 Porcelain plate f.desiccator150mm 32474-00 1 Rubber hose 39282-00 2 Rubber hose for vacuum 39286-00 1 Hose clip, diam. 8-16 mm, 1 pc. 40996-02 2	Funnel, glass, top dia. 50 mm	34457-00	1
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Rubber hose 39282-00 2 Rubber hose for vacuum 39286-00 1 Hose clip, diam. 8-16 mm, 1 pc. 40996-02 2	Desiccator, vacuum, diam. 150 mm	34126-00	1
Rubber hose for vacuum 39286-00 1 Hose clip, diam. 8-16 mm, 1 pc. 40996-02 2	Porcelain plate f.desiccator150mm	32474-00	1
Hose clip, diam. 8-16 mm, 1 pc. 40996-02 2	Rubber hose	39282-00	2
	Rubber hose for vacuum	39286-00	1
Glass rod,boro 3.3,l=300mm, d=7mm 40485-05 1	Hose clip, diam. 8-16 mm, 1 pc.	40996-02	2
	Glass rod,boro 3.3,l=300mm, d=7mm	40485-05	1





Wash bottle, plastic, 500 ml	33931-00	1
Spoon, special steel	33398-00	1
Crucible tongs, 200 mm, stainless steel	33600-00	1
Boiling beads, 200 g	36937-20	1
Silica gel, orange, granular, 500 g	30224-50	1
Silicon grease Molykote, 50 g	31863-05	1
Toluene 250 ml	30236-25	1
Sulphuric acid, 95-97%, 500 ml	30219-50	1
Sodium chloride, 500 g	30155-50	1
Water, distilled 5 l	31246-81	1

