

Rectification - the number of theoretical trays in a distillation column

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Principle

The separation power of a rectification (fractionating) column can be determined using an appropriate binary mixture whose equilibrium composition is measured in the distillation flask and in the domed glass head of the distillation apparatus. The number of theoretical trays can be numerically or graphically obtained from the measured values.

Benefits

- Complete insight into all running processes, because all components have an evacuated, but not silvered isolating-coat
- Simple withdrawal of samples through 2 column intermediate pieces
- High separation efficiency through 2 large packed columns
- Secure, because the high-efficiency condenser of the column head also condense high-volatile liquids
- Simple adjustment of the reflux ratios through onehand-controlled column head

Tasks

1. Prepare 10 mixtures of methyl cyclohexane and *n*-heptane with substance ratios (mole fractions) from 0 to 1 and with step width of approximately 0.1. To record a calibration curve, determine the refractive indices of the mixtures and plot them against the mole fractions.
2. Distill a mixture of methyl cyclohexane and *n*-heptane in a rectification column with total reflux until an equilibrium has been established. Determine the composition of the condensate and the number of theoretical trays in the column for a throughput of 500 and 1000 ml/h.

Learning objectives

- Bubble tray column
- Rectification
- Raoult's law
- Henry's / Dalton's law
- Boiling-point diagram
- Reflux ratio

Necessary accessories

- Precision balance 620g/0.001g

Scope of delivery

Set rectification plant, 230 V	35918-88	1
Abbe refractometer	35912-00	1
Immersion thermostat Alpha A, 230 V	08493-93	1
External circulation set for thermostat Alpha A	08493-02	1
Bath for thermostat, makrolon	08487-02	1
Rubber hose	39282-00	4
Rubber caps, 10 pcs	39275-03	1
Pasteur pipettes, 250 pcs	36590-00	1
Snap-cap vials, d=30mm, h=50mm, 10/pkg.	33624-03	2
Graduated cylinder, Borosilicate, 1000 ml	36632-00	1
Funnel, glass, top dia. 50 mm	34461-00	1
Stop clock, demo.; diam. 13 cm	03075-00	1
Boiling beads, 200 g	36937-20	1
HEPTANE, NORMAL 1000 ML	31366-70	1
Methylcyclohexane 1 l	31566-70	3
Water, distilled 5 l	31246-81	2
Temperature meter digital, 4-2	13618-00	1
Immersion probe NiCr-Ni, teflon, 300 °C	13615-05	4
Universal power supply, 600mA 3/4.5/5/6/7.5/9/12V, incl. 9 adaptors	11078-99	1