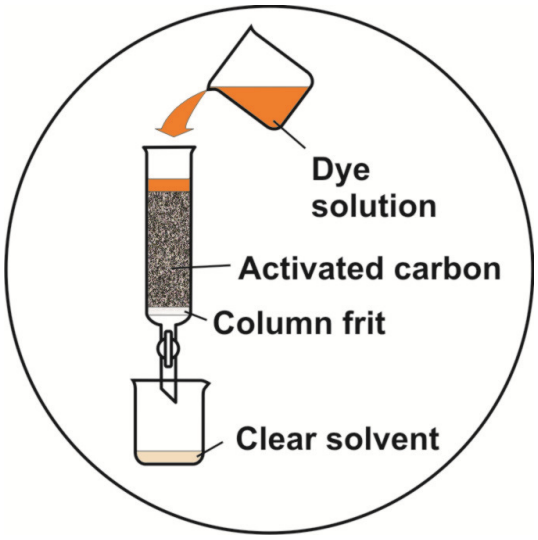
Adsorption on Activated Carbon



Equipment:

long glass tube with glass frit and stopcock at the lower end
beaker (250 mL)
[alternatively: 2 beakers (250 mL)
glass rod
glass funnel
folded filter paper)
support stand, clamp (or ring) and holder
Erlenmeyer flask

Chemicals:

granulated activated carbon
methyl orange
demineralized water

Safety:

methyl orange ($C_{14}H_{14}N_3NaO_3S$):

H301
P301 - 330 - 331 - 310

The azo dye methyl orange is toxic if swallowed.

Procedure:

Preparation: The glass tube is filled with activated carbon, which is then soaked with demineralized water. One has to wait until the water has dripped out of the column. Subsequently, a methyl orange solution is prepared (approx. 50 mg methyl orange per 100 mL water) and poured into the beaker.
Procedure: The methyl orange solution is poured into the pre-prepared tube and the solution dripping out the bottom of the column is collected in the Erlenmeyer flask.

Alternatively, approx. 70 g of activated carbon are placed into a beaker and moistened with demineralized water. Subsequently, the methyl orange solution is added to the activeted carbon and the suspension is stirred for approx. 1 to 5 min. It is then filtered by means of the funnel and the folded filter paper; the filtrate is collected in the Erlenmeyer flask.

Observation:

The collected water is clear or only slightly colored.

Explanation:

The dye is adsorbed on the activated carbon. The excellent adsorption capacity of activated carbon is due to its enormously large specific surface area of approx. 1000 $m^2\,g^{-1}$.

However, the experiment can also be done, for example, with soft drinks containing food coloring, or even with red wine.

Disposal:

The activated carbon is disposed of as a solid; the collected water can be flushed down the drain.