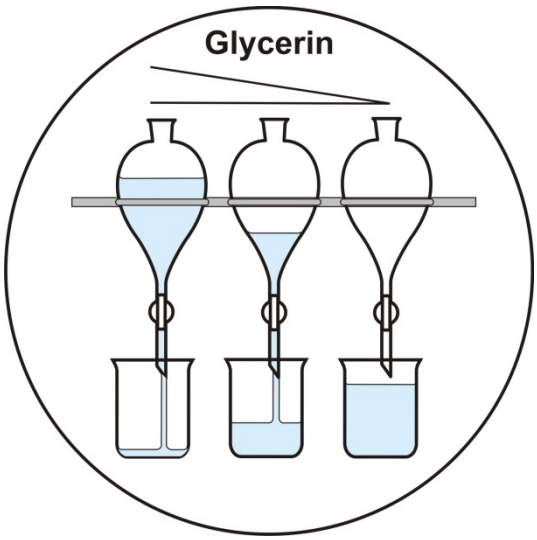
Outflow of Various Glycerin-Water Mixtures



Equipment:

3 separating funnels (100 mL)
ring stand
steel rod
4 clamp holders
3 support rings
3 beakers (e.g. 250 mL)

Chemicals:

glycerin
demineralized water

Safety:

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Procedure:

Preparation: First, two glycerin-water mixtures are prepared with mass fractions of glycerin of w = 0.8 and 0.5. The steel rod is attached horizontally to the ring stand and then the three rings are attached to the rod with the clamp holders. Subsequently, the separating funnels are placed in the rings. The two glycerin-water mixtures and the demineralized water are then filled into the separating funnels. Since the outlet stems of the funnels should remain as free of bubbles as possible, the liquids should be sucked up from the beakers into the separating funnels. Care must be taken to ensure that the filling levels are as equal as possible.
Procedure: The stopcocks are quickly opened, one after the other, starting with the mixture with the highest glycerin content.

Observation:

The demineralized water with a (dynamic) viscosity of 1 mPa s shows the shortest outflow time. Then follows the glycerin-water mixture with a mass fraction of glycerin of w = 0.5, whose viscosity is about 6 mPa s. The glycerin-water mixture with a mass fraction of glycerin of w = 0.8 runs out of the separating funnel even much more slowly (viscosity about 60 mPa s). (The indicated viscosities refer to a temperature of 293 K).

Explanation:

Liquids can flow more or less easily. The more viscous the liquid is under equal driving forces, the lower the flow velocity and thus the outflow velocity associated with it. In other words, a glycerin-water mixture runs out the faster, the lower the mass fraction of viscous glycerin (with a viscosity of 1412 mPa s at 293 K) in the mixture.

Disposal:

The mixtures can be added to the wastewater in a highly diluted form.