VISCOSITY

Experiment 1. Determination of the viscosity of the solution of glycerol

Equipment: - viscometer,
              - thermostat
              - pycnometer,
              - pipette,
              - funnel.
              - analytical balance,
              - 4 beakers.
Reagents: - glycerin
              - distilled water

Description of the experiment:

Weigh the pycnometer filled completely with distilled water, and then with each of glycerol solutions. Place the results on a sheet of the report.

Place the viscometer in a water bath in thermostat, set the temperature to 25 °C. When the temperature reaches set temperature fill the reservoir of the viscometer, up to about 2/3 by pouring through the opening C distilled water using a funnel.. Stop opening B by a finger and pick up liquid in the tube A using a syringe to the surge tank, which is located above the measurement container. Release your finger and measure the flow time of the liquid from between the red bars top and bottom. Perform three measurements. Measure the flow time similarly for the solutions of glycerol. Write down the results in a report sheet.
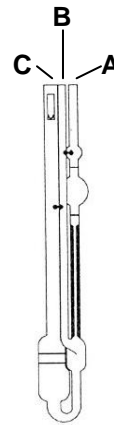

Fig.1. Pycnometer.

Fig.2. Viscometer

Experiment 1. Determination of the viscosity of the solution of glycerol

Table 1. Results of the measurements.

Liquid	m_{p+c}	$m_{solution}$ $(m_{p+s} - m_p)$	d [g/cm^3]	t [s]	$t_{average}$ [s]	η [cP]
Distilled water						
10% glycerol solution						
30% glycerol solution						
50% glycerol solution						

m_{p+s} – mass of the pycnometer with solution
m_p – mass of a dry pycnometer

1)   Calculate density of glycerol solutions using the formula:

$$d_{solution} = \frac{m_{solution} \cdot d_{water}}{m_{water}}$$

2)   Calculate viscosity of the glycerol solutions using the formula:

$$\eta_{solution} = \eta_{water} \cdot \frac{d_{solution} \cdot t_{solution}}{d_{water} \cdot t_{water}}$$

Values of the density and viscosity of water are given in Table 2.

Table 2. Density and viscosity of water.

T [K]	d [g/cm^3]	η [cP]
293	0.99823	1.0050

3)   Draw a graph viscosity vs. concentration and discuss the effect of concentration on viscosity.