

Mechanics of liquids and gases

Pressure in liquids

Pressure due to weight of water - Measurement using U-tube manometer

Objects of the experiments

1. Measuring the gravity pressure as a function of the depth of immersion
2. Investigating the pressure from below, from the side and from above at a constant depth of immersion

Setup



Apparatus

1 Liquid pressure gauge with U-tube manometer.....	361 57
1 Beaker, TPX, 3000 ml.....	664 134
1 Steel tape measure, 2 m.....	311 78
1 Beaker, PP, 100 ml, squat.....	664 121
1 Stand base, V-shape, large.....	300 01
1 Stand rod, 25 cm, 12 mm diam.	300 41
1 Stand rod, 47 cm, 12 mm diam.	300 42
2 Leybold multiclamps.....	301 01
1 Colouring, red, 10 g.....	309 42

Carrying out the experiment

1. Gravity pressure as a function of the depth of immersion:
 - Fill 2500 ml of coloured water into the beaker. Then fill half the manometer tube with coloured water.
 - Place the pressure gauge immediately under the water surface, and define this position to be the depth of immersion $h = 0$.
 - Connect the U-tube manometer, and mark the level of the manometer liquid as zero by shifting the scale.
 - Displace the pressure gauge downwards by 2 cm, and read the pressure change in terms of scale divisions (difference between the right and the left manometer tube).
 - Repeat the measurement with immersion depths of 4 cm, 6 cm, 8 cm, and 10 cm.
2. Pressure from below, from the sides and from above:
 - At an arbitrary depth of immersion, rotate the pressure gauge in all directions using the hook and observe the liquid level at the U-tube manometer.
 - Repeat the measurement at another depth of immersion.

Measuring example

1. gravity pressure as a function of the depth of immersion:

Depth of immersion h in cm	Pressure p in terms of scale divisions
0	0
2	1.5
4	3.0
6	4.5
8	6
10	7.5

2. Pressure from below, from the sides and from above:

When the pressure gauge is rotated in arbitrary directions, always the same pressure is displayed.

Evaluation

1. The pressure due to gravity in a liquid increases with the depth of immersion.
2. At a certain depth of immersion, the pressure from below, from the sides and from above is equal.