Virtual lab #4 (5%)

Properties of Fluids

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Student #\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Date:

This lab is worth 40 points; 5% of total course marks.

Instructions to access virtual lab

Go to portal <https://gibbs.beyondlabz.com/>

Log in to Beyond Labz.

In the Web section click on “Density” lab.

Introduction

A fluid is any substance that flows or deforms under applied shear stress. Fluids comprise a subset of the [states of matter](https://www.thoughtco.com/states-of-matter-p2-608184) and include [liquids](https://www.thoughtco.com/definition-of-liquid-604558), [gases](https://www.thoughtco.com/definition-of-gas-604478), and plasma. Examples: All liquids and gases are fluids (air, water, oil).

(Source: Helmenstine, Anne Marie, Ph.D. "What Is the Definition of a Fluid?" ThoughtCo, Aug. 28, 2020, thoughtco.com/definition-of-fluid-604466.)

Properties of fluids: density, viscosity, compressibility, surface tension and more.

For additional information read: “What is a fluid? Properties of fluids” available at <https://www.brighthubengineering.com/hydraulics-civil-engineering/42883-basic-properties-of-fluids/#properties-of-fluids>

Purpose

The purpose of this virtual experiments is to explore such properties of fluid as density and viscosity.

**Experiment 1**

**The Comparison of Viscosities of Two Fluids**

Instructions:

Click on the clipboard with preset list of experiments in the right top corner of the screen.

Open preset list. Then choose “Compare the Viscosities of Two Fluids” and click on it. All the equipment will be set up.

Purpose:

To observe the difference in viscosity of acetone and honey.

Materials:

Acetone, honey, three graduated cylinders; three rubber balls; timer; scale; lab book.

Procedures:

1. Drop the ball in the 1st cylinder. Write down the time it takes to reach the bottom.
2. Drop the ball in the 2nd cylinder. Write down the time it takes to reach the bottom.
3. Drop the ball in the 3rd cylinder. Write down the time it takes to reach the bottom.
4. Fill out the table below.
5. Click “Exit” to leave the lab

Data Recording (3 points):

Fill out the missing information

Table 1

|  |  |  |  |
| --- | --- | --- | --- |
| Cylinder (from left to right) | Liquid type | Liquid volume, ml | Time, seconds |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |

Analysis (5 points):

What have you observed?

What was different in each experiment? Why?

Conclusion (3 points):

Summarize your observations and explain them using physics.

**Experiment 2**

**Cesium in Oil and Water**

Instructions:

Go to “Density” lab. Click on the clipboard in the right top corner of the screen. Open preset list. Then choose “Cesium in Oil and Water” and click on it. All the equipment will be set up.

Purpose:

To explore what happens when you drop cesium metal in oil and water.

Materials:

Two graduated cylinders; olive oil, water, two cesium balls; timer; lab book.

Procedures:

1. Drop the ball in the 1st cylinder. Write down the time it takes to reach the bottom.
2. Drop the ball in the 2nd cylinder. Write down what happens
3. Fill out the table below.
4. Click “Exit” to leave the lab

Data Recording (2 points):

Fill out the missing information

Table 2

|  |  |  |  |
| --- | --- | --- | --- |
| Cylinder (from left to right) | Liquid type | Liquid volume, ml | Time, seconds |
| 1 |  |  |  |
| 2 |  |  |  |

Analysis (3 points):

What have you observed?

Conclusion (5 points):

Summarize your observations and explain using physics terms.

**Experiment 3**

**Finding Densities of Virtual Solids**

Instructions:

Open “Density” lab.

Purpose:

To find the densities of unknown solids.

Materials:

5 graduated cylinders; balls with different unknown densities; scale; timer; lab book.

Procedures:

1. Fill two cylinders full with water.
2. Chose virtual solid B.
3. Put in on the balance and record its mass.
4. Record the initial volume of water by zooming into the surface of the liquid and reading the scale that will appear to the right.
5. Place Virtual solid B into the graduated cylinder.
6. Drop it.
7. Record the new volume of water in the cylinder.

Repeat the same procedure for Virtual solid C.

**Include screen shots before and after the ball was dropped into cylinder for both cases solid B and solid C.**

Data Recording (5 points):

Fill out the missing information

Table 3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Virtual Solid  | Mass, g | Initial volume of water, ml | Final volume of water, ml | Volume of the solid, ml | Drop time, seconds |
| B |  |  |  |  |  |
| C |  |  |  |  |  |

Analysis (5 points):

Definition of Density:

$$density= \frac{mass}{volume}$$

Volume of the solid = Final volume of water – Initial volume of water

**Please include the units when reporting density. Are they SI units?**

Mass is in the table.

1. Calculate the density of Virtual solid B. Show your work.
2. Calculate the density of Virtual solid B. Show your work.

**Use Search engine (for example, Google) to identify the substance Virtual solids B and C are made of.**

Conclusion (5 points):

Summarize the experiment and what have you learned about physics by doing it.

Answer the Questions (5 points):

1. What properties of fluid were explored in this lab?
2. What was the most interesting part of the lab?
3. What did you like the least?
4. Was there anything surprising or unexpected about this lab?
5. What did you learn by doing this lab?

**Experiment 4 Optional**

Explore the “Density” lab

Try your own experiments.

Write down about one of them: what you did and what was the results.