

Lab Report 1- PHysiological Instrumentation

Purpose

The purpose of this lab is to be able to measure and record necessary data in a cohesive manner, another objective is to know how to convert measurements to the needed unit of measurement. Finally, it also teaches how to use the instruments needed to make such measurements and their discrepancies in some cases.

Procedures

Linear measurements:

1. Measure and record the length, width, and depth of your lecture text(in centimeters) using a ruler
2. Take the given measurements in centimeters and use the conversion factor of $1\text{cm}=10\text{mm}$ to convert them to millimeters and record

Volume Measurements:

1. Pour some water into a beaker and record the amount in milliliters
2. Convert the volume from milliliters to liters using the conversion factor of $1\text{ml}=.001\text{L}$
3. Pour the same water from the beaker into a graduated cylinder and record the given volume in milliliters
4. Convert the volume from milliliters to liters using the conversion factor of $1\text{ml}=.001\text{L}$

Mass measurements:

1. Using a scale, measure out the weight of any object(ex. A pencil) and record the weight given in grams
2. Take the weight in grams and convert it to milligrams by multiplying the conversion factor of $1\text{g}=1000\text{mg}$, giving you milligrams
3. Take a beaker and place it on the scale
4. Once it's done measuring the weight of the beaker, zero out the scale so it no longer reads the weight of the beaker
5. After the scale has been zeroed out, add water to the beaker and measure the weight of the liquid in grams
6. Take the weight in grams and convert it to milligrams by multiplying the conversion factor of $1\text{g}=1000\text{mg}$, giving you milligrams

PH measurements:

1. Acquire 3 test tubes, a test tube holder, and PH test strips
2. Label the three test tubes with A, B, and C
3. Pour 3 drops of the given liquids into the appropriately labeled test tube(Liquid A into test tube A, liquid B in test tube B, and liquid C into test tube C)
4. Tear off 3 pieces of PH testing strips and insert one into each of the three test tubes and allow it to soak for around 30 seconds until it changes color
5. Using the chart on the PH test strip dispenser, compare the colors of the strips that are in the liquid to the chart and determine their individual PH and record.

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Time measurements:

1. Using a PPhone or stopwatch, prepare a timer for 15 seconds
2. Place your finger on your neck where you can feel your heart beating
3. Start the timer and count how many beats you feel for 15 seconds and record
4. To determine beats per second take the amount of beats you recorded and divide it by 15 seconds, giving you beats per second
5. To determine beats per minute take the beats per second value and multiply it by 60 seconds, giving you beats per minute
6. Using a PPhone or stopwatch, set a timer for 60 seconds
7. Place your finger on your neck where you can feel your heart beating
8. Start the timer and count how many beats you feel for 60 seconds and record
9. To determine beats per second, take the value you recorded and divide it by 60 seconds, giving you beats per second
10. To determine beats per millisecond take the beats per second and divide by 1000, giving you beats per millisecond.

Results

Linear measurements:

1. Length of lecture text: 28 mm 2.8cm
2. Width of lecture text: 23.6 mm 2.36cm
3. Depth of lecture text: 1.5 mm 0.15cm

Volume Measurements:

1. Water in beaker measurement: 50 ml 0.05L
2. Same water but in graduated cylinder measurements: 46 ml 0.046L

Mass Measurements:

1. Mass of object(pencil): 5320 mg 5.32g
2. Mass of liquid: 44560 mg 44.56g

PH measurements:

1. PH of liquid in container "A": 4
2. PH of liquid in container "B": 7
3. PH of liquid in container "C": 11

Time measurements:

1. Pulse rate after 15 seconds: 1.33 beats/second
80 beats/minute
2. Pulse rate after 60 seconds: 78 beats/minute
1.3 beats/second
1300 beats/ millisecond

Discussion

Linear measurements: the results for the linear measurements are straightforward, the main objective was essentially to be able to use the tool given(a ruler) and accurately

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record and convert the obtained measurements to the needed unit of measurement. A complication or error that could occur is not using the correct conversion factor needed for the specific measurement, for example since the measurement was given in cm had we not known that there is 1cm for every 10 mm we would've gotten the wrong measurement for mm.

Volume measurements: The results for the volume measurements yielded some unexpected results, for the initial first run we put water into a beaker and got a rough measurement of about 50ml, but when transferred to a more proper measuring apparatus in the form of a graduated cylinder, it gave out a measurement of 46ml. This discrepancy between the two shows us that a beaker is not an accurate container to get precise measurements in but is more so to simply hold a liquid, on the other hand, we are also shown that when a precise measurement is needed, it is best to use a graduated cylinder. Using the wrong tool will yield inaccurate results causing errors throughout an experiment, to best avoid this one needs to make sure they are using the proper tool needed to measure liquids.

Mass Measurements:

The results for mass measurements were also straightforward, simply placed the objects and measured their weight. An error could occur if one doesn't properly zero the scale, this adds weight that isn't there or interferes when just trying to look for the weight of just a liquid and not the container it's in.

PH Measurements:

The PH measurement results were interesting to see. Although we do not know what liquids were in what bottle we got to see the PH from each of the three categories on

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the PH scale(acidic, neutral, and alkaline). The first result yielded a light green almost yellow-looking color, the corresponding PH was 4 making container “A” acidic. The Second result on container “B” yielded a dark green color that corresponds to 7 on the PH scale, making container “B” neutral. The final result from container “C” yielded a dark blue almost purple-looking color making it a PH level of 11, this means that container “C” is alkaline. The trend that can be noticed from the PH scale is, numbers less than 7 are acidic and numbers greater than 7 are basic/alkaline.

Time measurements:

Results for time measurements are again straightforward as we simply counted our heartbeats and converted those to either seconds or minutes, a trend I did notice is to convert to beats per second one must simply divide the heartbeat total by the number of seconds, this trend can also be used to convert to beats per minute by taking the number of beats per second and multiplying it by 60.

Conclusion

1. In linear measurements, we learned how to measure length, width, and depth and how to convert those numbers from a given(cm) unit to a needed unit(mm)
2. In volumetric measurements, we learned how it is important to use the proper tools when measuring liquids in a container to avoid getting inaccurate readings and also how to convert milliliters to liters.
3. In mass measurements, we learned how to properly use a scale and how it functions, and how to avoid getting inaccurate readings. We also learned how to convert from grams to milligrams.
4. In PH measurements we learned how to properly use and read PH strips when trying to determine if a substance is acidic, neutral, or alkaline(basic) by taking the color from the strip and comparing it to the scale.
5. In time measurements we learned how to measure our heartbeats and convert them to a needed unit like beats per minute, or beats per second.