

Density Lab

This test will begin at 10:15. The first slide will ask you for your school, team and team members. 1 person should submit answers for the team. Once the section gets to 0:00, the test moves on but DOES record the answers you have clicked.

Quiz

Section 1

The density of an object is:

- The same as its weight
- The volume divided by the mass $D = v/m$
- The mass divided by the volume $D = m/v$
- The same as the size of the object



An object should float in a liquid if it is:

- Less dense than the liquid**
- Lighter than metal
- Shaped like a ball
- More dense than the liquid

What is the volume of 1 mole of gas at STP?

- 2.24 L
- 22.4 L
- 224 L
- Cannot be determined without more information

Which of the following is a correct unit for density?

- g/cm^2
- kg/m^3
- mg/kg
- mg/cm



If you cut a metal bar in half, each half would have

- Half the density of the original piece
- Twice the density of the original piece
- The same density as the original piece**
- No density at all

Density is a characteristic property of a substance. That means the density of water:

- Changes depending on the volume
- Stays the same regardless of the volume**
- Is greater for a greater mass of water
- Is less for a smaller mass of water

If multiple objects have the same volumes but different masses,

- The one with the larger mass has the higher density
- They must have the same density
- The one with the smaller mass has the higher density
- The one with the smaller mass is twice as dense

Open Ended Question

(4pts) The density of a substance is 4.632 grams per milliliter. What is the mass of 0.35 liters of the substance in grams? Don't forget to hit Submit before the timer gets to 0:00 to record your answer.

1621.2 grams

Open Ended Question

(4pts) If I have 20.0 Liters of gas at a pressure of 79.0 atm and a temperature of 800 K, what will be the volume of the gas if I decrease the pressure 40.0 atm and decrease the temperature to 750 K? Don't forget to hit Submit before the timer gets to 0:00 to record your answer.

combined gas law equation- $p_1V_1/t_1 = p_2V_2/t_2$

$$V_2 = [(79.0)(20.0)(750)]/[(800)(40.0)] = 37.03 \text{ L}$$



Quiz

Section 2



If a stone of mass .45 kg is thrown in water and sinks. Calculate the buoyant force acting on it?(assume $g = 9.8$)

- More information is needed
- 4.41 N
- 4.5 N
- 9.8 N

Based on Boyle's Law and the assumptions associated with it, if the pressure of a system is increased then :

- The temperature will increase
- The volume will increase
- The temperature will decrease
- The volume will decrease**

All gases have a volume of 22.4 L when the ideal gas law is used.

- True
- False

For a gas, which pair of variables are inversely proportional to each other (if all other conditions remain constant)?

- P, T
- P, V
- V, T
- n, V
- n, P

Which of the following is true of the buoyant force?

- It acts in the downward direction.
- It acts with the force of gravity.
- It acts in the upward direction.**
- It makes an object feel heavier.

The mass of atoms, their size, and how they are arranged determine the _____ of a substance.

- Density
- Size
- State
- Temperature

What piece of lab equipment is commonly used to determine the volume of an object?

- Scale
- Pipet
- Graduated cylinder
- Hot plate

Density divided by mass is equal to:

- power
- area
- energy
- volume

Open Ended Question



(4pts) A dog is known to have a density of 522 kg/m^3 , 1. What percentage of the animal's body will be submerged when floating in water? 2. What percentage will be submerged in a salt water with a density of 1117 kg/m^3 ? Number your answers and be sure to hit Submit before the timer gets to 0:00.

water answer- $522/1000$ - 52.2%

salt water answer- $522/1117$ - 46.73%

Open Ended Question



(4pts) A rock is placed under water and displaces 27 ml of water. If the rock's mass was found to be 38.45 g when placed on the scale, what is the density of the rock in g/cm^3 ? Hit Submit on your answer before the timer gets to 0:00.

-1.424



Quiz

Section 3

Which material has the smallest density?

- Clay
- Coal
- Cotton
- Banana

If pressure is constant, the relationship between temperature and volume is

- Directly Proportional**
- Indirectly Proportional

Which of the following is a method to increase the pressure of a gas?

- Decrease temperature
- Increase volume
- Increase the number of particles**
- Lower the kinetic energy of the particles

Which is the upward force on a swimmer that balances the downward force of gravity and keeps the swimmer from sinking?

- atmospheric pressure
- Buoyant force
- Density
- Friction

Pressure is the force per unit

- Volume
- Surface Area**
- Length
- Depth

At constant temperature and pressure, gas volume is directly proportional to the

- Molar mass of the gas
- Number of moles of gas
- Density of the gas at STP
- Rate of diffusion

The standard molar volume of a gas is all of the following except

- The volume occupied by one mole of gas at STP
- Equal for all gases under the same conditions
- 22.4L at STP
- Dependent on the size of the molecules**

Open Ended Question



(6pts) A spherical ball of density .70 kg/L has a radius of 10 cm. If the ball is placed on the surface of the water and released, how much water will be displaced by the ball? (Volume of a sphere = $(4 \cdot \pi \cdot r^3) / 3$) (density of water = 1 kg/m^3) (hint: pay attention to units). Show your work for partial credit and remember to hit Submit before the timer gets to 0:00.

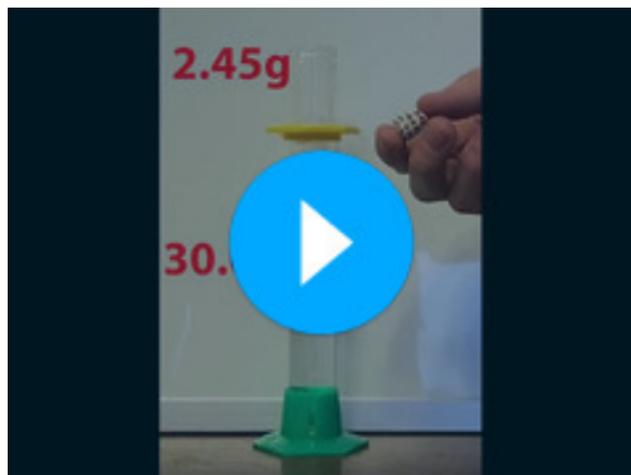
correctly calculating volume = $4000 \cdot \pi / 3 \text{ cm}^3 = 4 \cdot \pi / 3 \text{ L}$
multiplying by density to get a mass of 2.93 Kg displaced
answer of 2.93 L because the density of water is 1 kg/m^3

Open Ended Question

(4pts) A block of wood has sides length of 4cm, 5cm, and 8 cm. If the block weighs 26 grams, what is the density of the block of wood? Don't forget your units! Remember to hit Submit before the timer gets to 0:00.

.1625 g/cm³

Open Ended Question



(4pts). Watch the video. 1. What was the change in volume due to the object being placed into the cylinder? 2. What mass would the object need in order to have a density of 3.5g/cm^3 ? 3. If the mass of the object was found to be 2.45g. What is the density of the object? 4. If the object would have failed to sink to the bottom what would that mean is true about the object's density in comparison to water? Number your answers and remember to hit Submit before the Timer gets to 0:00 to record your answer!

1. What was the initial level of the water in the graduated cylinder? **30ml**
2. What was the change in volume due to the object being placed into the cylinder? **2.5ml**
3. What mass would the object need in order to have a density of 3.5g/cm^3 ? **8.75g**
4. If the mass of the object was found to be 2.45g. What is the density of the object? **.98g/cm³**

If the object would have failed to sink to the bottom what would that mean is true about the object's density in comparison to water? **smaller**



Quiz

Section 5

What is the mass of 78 mL of Isopropyl Alcohol if the density of the liquid is .63 g/mL?

- 63 g
- 78 g
- 49 g
- 123g

A scientist needs a mixture that contains .875 g of sodium chloride. If there are .076 g/mL in the solution containing sodium chloride, how much solution is required to have the desired mass of sodium chloride?

- 13.1 mL
- 15.2 mL
- 17.3 mL
- 11.5 mL

0.0006 grams of mercury was found in a 5 kg sample of water. What is the concentration of mercury in ppm?

- 120 ppm
- 0.12 ppm
- 120000 ppm
- 12000 ppm

The density of ethanol is known to be $.78 \text{ g/cm}^3$. If a sample of ethanol is found to have a volume of 3.45 ml. What is the mass of the sample?

- .226 g
- .78 g
- 2.69 g
- 4.423 g

A solution is prepared by dissolving 130 mL of hydrogen peroxide to make 2500mL of solution. What is the concentration of hydrogen peroxide by volume?

- 130%
- 12.5%
- 10.4%
- 5.2%