**ABSTRACT**

The matter exists in solids, liquids and gases. They all have specific volume and mass which important in measuring the density of different materials. In case of solids and liquids, different approaches are used to measure density. Solids may have regular or irregular shape, in both cases, densities can be measured by obtaining their volume and weight. If the densities of regular and irregular solids is same as observed in this lab experiment, it means that material solid is made up of is similar. Densities of liquids is also measured on the same basic principles. It was observed that mercury was denser than alcohol and different weights of carbon tetrachloride changed its density.

The matter possesses mass and volume, be it solid, liquid or gas. This principle lies to all states of matter. The density is an essential physical property of all materials. The density of the matter is the ratio of mass to its volume, which is expressed in grams per cubic centimeter. The temperature and pressure are the contributing factors to it. There are different methods to determine density depending upon the type of matter. For example, in case of solids and liquids both have different approaches to be used for measuring the density.

For the sake of measuring it, value of mass of that matter is required for which analytical balance was used. In case of liquids, container mass was also measured and the difference of empty and filled container was obtained for the actual mass of the liquid. In case of measuring volume it is easy with respect to liquids while complicated in case of solids which are mostly irregularly shaped, therefore, liquid displacement method was employed.

Solids can be regular or irregular. Both have volumes which can be determined with two different approaches as performed in lab experiment as well. The density of cylinder was to be measured, for which first of all weight was calculated which was 29.90 g. For determining the volume of cylinder, it's height (by vertically positioning the cylinder) and radius (diameter of the cylinder was calculated before) were measured and ultimately density of 0.90 grams per cubic centimeter was obtained.

Following the Archimedes principle, if the object is heavier than the liquid, it will sink and its volume is measurable by liquid displacement approach. Same was followed in this case of measuring density of an irregular solid. It was observed that both densities of regular and irregular solids were same. It is important to notice here that if solids are made of similar material, the density of all the objects regardless of the shape they possess (regular/irregular) will remain same.

The density of an unknown liquid and water were measured and compared. Similar approach like that of in case of solids was employed here as well. The weight and volume of both liquids were calculated. It was found that an unknown liquid was denser than that of water. The former one had the density of 1.08 grams per milliliter, whereas, water has the density of 0.97 grams per milliliter. An important factor while measuring the density of materials is that solids or liquids expand or contract with the change in temperature conditions which ultimately impacts volume of materials. Therefore, temperature was measured while measuring the densities of both solids and liquids.

For the sake of understanding, masses and densities of two liquids i.e. mercury and alcohol were determined and related. It was found that mercury being metal is heavier than water and ultimately denser than it. Alcohols being liquids are less dense than metals. This is the reason that mercury is denser than alcohol. It is found that mass of an object is directly proportional and directly effects the density of an object.

The density is thus an important characteristic in studying various substances. They can be used to measure densities of unknown pure substances and also to differentiate between metals similar in appearance.