

GIRLS' HIGH SCHOOL AND COLLEGE, PRAYAGRAJ
WORKSHEET-3
SESSION 2020-2021
CLASS 8 (A,B,C,D&E)
SUBJECT-PHYSICS

Note- Parents please ensure that the student takes the reference of the chapter from the links mentioned below.

Link- FLOATING AND SINKING-https://youtu.be/SDFii_Ki0ug

FLOATATION OF IRON SHIP- <https://youtu.be/-ykZsC5M2lg>

MATTER- <https://youtu.be/i2NouGcwAsQ>

CHAPTER 2- PHYSICAL QUANTITIES AND MEASUREMENT

In the previous worksheet we have learnt how to determine the density of a liquid using the mass and volume of a liquid. We have also learnt about the specific gravity bottle. In this worksheet we are going to discuss the concept of 'Floating and Sinking'.

FLOATING AND SINKING

- A body is said to be floating in a liquid when it is on the surface of the liquid or just below it and it is said to sink when it goes to the bottom of a vessel containing the liquid and rests there.
- Whether an object will sink or float in a given liquid depends on:
 - i. Density of the object
 - ii. Density of the liquid under consideration.
- If the density of the object is greater than that of the liquid the object will sink, and if its density is less than that of a liquid, it will float.
- The density of liquid depends on the *temperature*, with the rise in temperature density decreases and on cooling density increases. It also depends on *the amount of impurity in it*, adding salt or any impurity in a liquid will increase its density. For example, if we take a lemon and place it on the surface of water it will sink because the density of lemon is more than the density of water but the same lemon will float in the solution of salt in water because the dissolved salt will make the density of solution higher than the density of the lemon.



FLOATATION OF IRON SHIP

- If we place an iron nail on the surface of water, it will sink. This is because the density of iron is greater than that of water. On the other hand, ships are also made of iron but they do not sink. This is because the ship is hollow and the empty space in it contains air which makes its volume large and average density less than that of water.
- Ships rise and sink deeper in accordance with the density of the water in which they float. Ships rise when they enter a sea or ocean from a river because seawater has a greater density than fresh water.
- Ships also rise and sink deeper with changing temperature. The density of water decreases as the temperature increases, so they sink deeper in warm water.
- This rise and fall in the level of water can be dangerous if a ship is loaded too heavily. This is



why all ships have a *waterline*, which is a mark painted around the body of a ship to protect it from the danger of being overloaded and getting sunk. It should never go below the level of water. In the figure, you can see the waterline of the ship painted in red colour.

FLOATING LIQUIDS

As in the case of the solids floating or sinking in a liquid, whether a liquid floats or sinks in another depends on the densities of the two liquids. Some of them mix readily with each other, so rather than floating or sinking into distinct layers, they form a mixture. For example, the density of milk is higher than that of water but when we mix the two, the milk will not sink and form a distinct layer because it mixes readily with water.



ACTIVITY BASED ON FLOATING LIQUIDS

In the figure, it is showing certain liquids having different densities. Can you predict which liquids are having more density than water and which are having less density than water?

MATTER

In this topic we will discuss how the properties of matter in the three states can be explained in terms of kinetic theory of matter. To begin with, let us learn about the kinetic theory.

THE KINETIC THEORY OF MATTER

- According to the kinetic theory, matter is made up of tiny particles (atoms or molecules) that are in constant state of motion.
- The kinetic theory distinguishes between the three states of matter on the basis of arrangement and movement of the particles of matter.
- The three states of matter differ from each other in terms of arrangement of the particles, the force that binds these particles and the freedom with which the particles move about.
- The attractive force between the particles of matter is called intermolecular force and the space between the particles is called intermolecular space.

THE THREE STATES OF MATTER

Matter can exist in any of the three states - solid, liquid and gas. The existence and properties of the three states of matter can be explained on the basis of kinetic theory of matter.

The Solid State

- In a solid, the particles are packed close together in an orderly manner. The intermolecular force binding them is strong. Thus, the particles can neither move away from each other, nor can change their position relative to each other. This is why solids have a definite size and shape.
- The particles are held strongly in place, they cannot be pushed or pulled by the application of a force. This makes solids rigid.
- The particles of a solid are so tightly bound to each other that they can only vibrate about the same position. Thus, they do not have much kinetic energy. Of all the three states, solids have the least amount of energy.

The Liquid State

- In a liquid, the particles are packed more loosely and randomly than they are in a solid.
- The intermolecular space is greater, so the intermolecular force is less than that in a solid. This allows the particles to slip past each other and change their relative positions. This is why a liquid has no particular shape and can flow.
- The intermolecular force is strong enough to hold the particles together within a particular volume. The particles cannot be pushed in closer by applying a force. Thus, a liquid has a definite volume and is almost incompressible.

- The particles of a liquid can move about much more vigorously than the particles of a solid. Thus, the energy of liquids is greater than that of solids.

The Gaseous State

- In gases, the particles are so far apart that there is hardly any intermolecular force between them. They are completely free to move about in any direction they please. Hence, a gas has neither a definite shape nor a definite volume.
- Since, the particles are not tightly bound they can be pushed into small space. This is what makes gases highly compressible.
- Gases flow since the particles are free to move about.
- Gases and liquids are called fluids because of their ability to flow.
- Of the three states, gases have the greatest amount of energy.

Comparing The States Of Matter

SOLID	LIQUID	GAS
Particles are tightly packed, usually in a regular pattern. (high density)	Particles are close together with no regular arrangement. (medium density)	Particles are well separated with no regular arrangement. (low density)
retains a fixed volume and shape.	assumes the shape of the part of the container which it occupies.	assumes the shape and volume of its container.
vibrate (jiggle) but generally do not move from place to place.	vibrate, move about, and slide past each other.	vibrate and move freely at high speeds.
not easily compressed.	not easily compressed.	compressible.
have intermolecular forces of attraction between the particles which are very strong.	have intermolecular forces of attractions between the particles which are relatively strong.	have intermolecular forces of attractions between.
does not flow easily.	flows easily.	Flows very easily.

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DENSITY OF MATTER IN THE THREE STATES

- The density of a substance is greatest in solid state, less in liquid state and least in gaseous state.
- However there are some exceptions like:
 - i. Ice, is a solid and its density is less than its liquid form(water) that is why it floats on water.
 - ii. Bromine, a reddish brown liquid at room temperature, has density of 3.13 g/cc, which is greater than that of aluminium (2.7g/cc).
 - iii. Density of mercury (13.59g/cc) is far greater than aluminium, copper(8.92g/cc) and iron(7.87g/cc).

ANSWER THE FOLLOWING QUESTIONS:

I. ANSWER IN DETAIL

- i. Give reason why an iron nail sinks in water whereas ships, which are largely made of iron float on water.
- ii. Distinguish between the three states of matter(write any five differences).
- iii. "The density of solids is greater than the density of liquids". Does this statement hold for all solids and liquids? Justify your answer.
- iv. Write a short note on 'Kinetic theory of Matter'.

II. ANSWER IN SHORT

- i. What is the waterline of a ship?
- ii. When does a body float in a liquid?
- iii. Why does lemon sink in water and float in the salt solution?
- iv. What are the (external) characteristics of a solid?
- v. Why liquids have no definite shape but a definite volume?
- vi. What happens when a ship enters a sea from a river?
- vii. Define intermolecular space.
- viii. List any two characteristics of a liquid.
- ix. What are the two factors on which the density of liquid depends ?
- x. Differentiate between floating and sinking.

III. FILL IN THE BLANKS

- i. A body is said to be in a liquid when it is on the surface of the liquid or just below it.
- ii. The density of a substance is greatest in state.
- iii. Whether a liquid floats or sinks in another depends on the of the two liquids.
- iv. Gases and liquids are called because of their ability to flow.
- v. The attractive force between the particles of matter is called

IV. CHOOSE THE CORRECT OPTION

- i. Density of mercury is far than aluminium.(greater/less)
- ii. Of all the three states, have the least amount of energy.(solid/gases)
- iii. Intermolecular force is greatest in(solids/gases)
- iv. The density of water as the temperature increases. (decreases/increases)
- v. The lemon will in the solution of salt in water.(float/sink)

V. WRITE TRUE OR FALSE

- i. Unlike liquids, gases do not flow.
- ii. Gases have a fixed volume.
- iii. The density of sea water is greater than that of freshwater.
- iv. The energy of liquids is greater than that of solids.
- v. The density of ice is more than that of water.

END