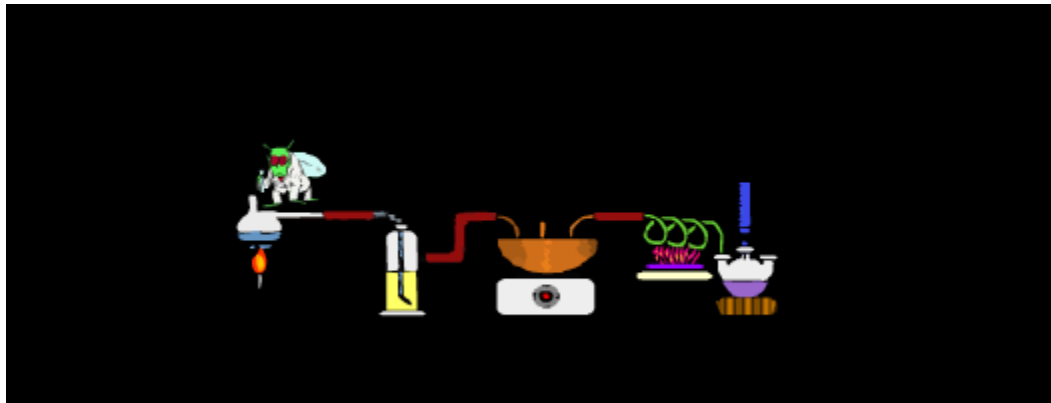


Intermediate Science 8

UNIT 3 FLUIDS



Chapter 7: Viscosity describes a fluid's resistance to flow

Fluids



Science 8

Unit 2:

Topic 1: Matter and The Particle Theory



TOPIC 1: OBSERVING MATTER

Matter is anything that has mass or takes up space.

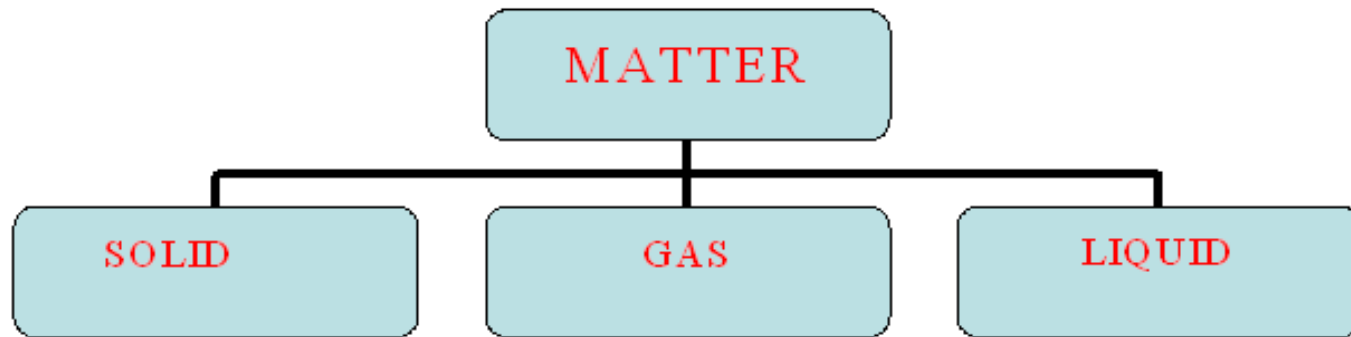


Examples: Books, humans, Oxygen, water...etc.

Fluids



Three States of Matter

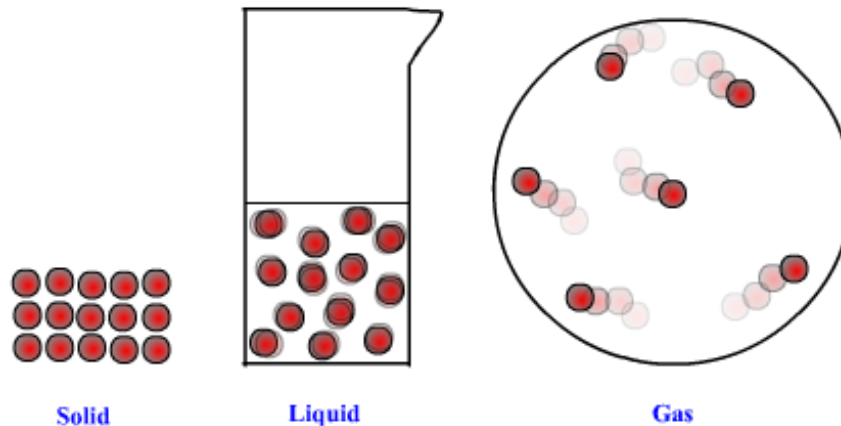


Fluids



Changes in States of matter

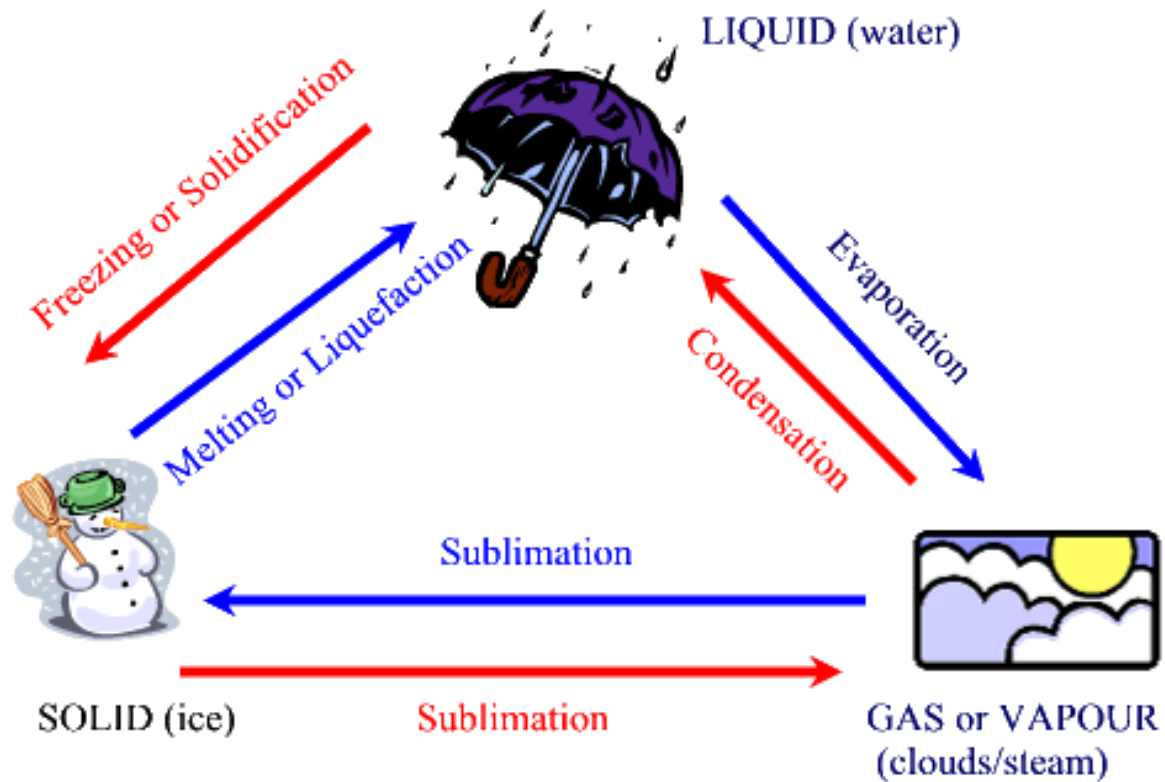
When enough heat is added to a solid, it will eventually melt and become a liquid. More energy will result in it becoming a gas as the boiling point is reached. As particles gain energy they move faster, require more space and therefore spread out (their volume increases).



Fluids



Changes In States of Matter



Fluids



Changes of State

1. **Melting**: changing from a solid to a liquid.

– [Animation of ice melting.](#)

2. **Freezing**: changing from a liquid to a solid.

3. **Sublimation**: changing directly from a solid to a gas.

Ex: dry ice used in a smoke machine

4. **Deposition** changing directly from a gas to solid. Ex: snowflake forming,

5. **Evaporation**: changing from a liquid to a vapour.

6. **Condensation**: changing from a gas to a liquid.

Fluids



Changes In States Of Matter

CHANGE	FROM	TO	EXAMPLE
Sublimation	solid	gas	Moth crystals disappear when left in a closet for several days
Deposition	gas	solid	frost forms on a car's windshield
Melting	solid	liquid	An ice cube turns into water when left out of the freezer
Solidification (Freezing)	liquid	solid	bottle of water will turn into ice if left in the freezer
Condensation	gas	liquid	Drops of water form on the mirror when taking a hot shower
Evaporation	liquid	gas	Rain dries up when the sun comes out

Fluids

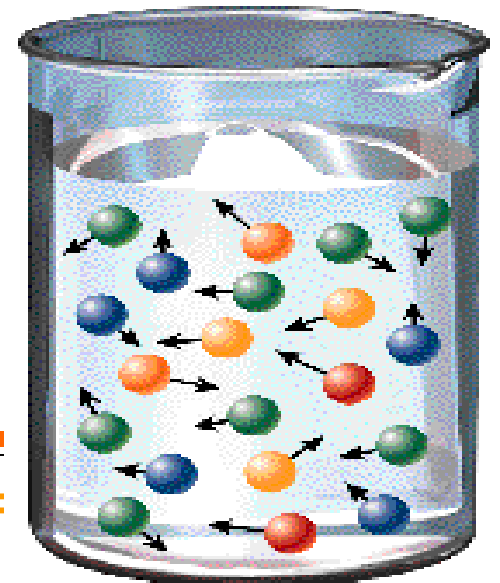


Welcome to the Particle Theory

1. All matter is made up of very small particles.
2. All particles in a pure substance are the same
 - Different substances contain different particles.



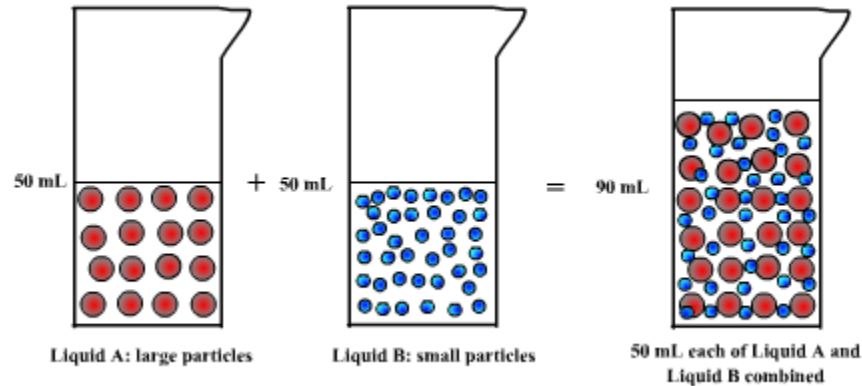
F



3. Particles are attracted to each other.

- They can have a strong attraction or a weak attraction.

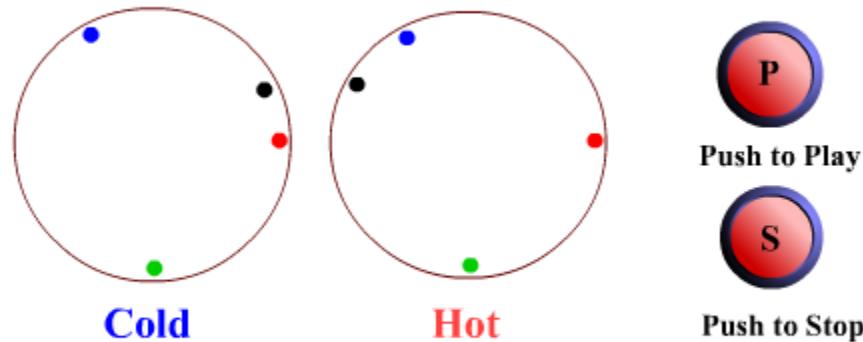
4. There are spaces between all particles



5. Particles are always moving.

When particles gain energy, (heat up) they move faster.

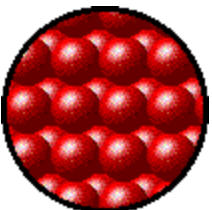

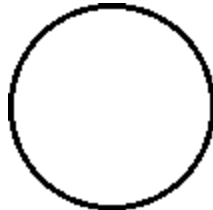
When they lose energy, (cool down) they move slower



Fluids



Solid, Liquid and Gas

SOLID 	LIQUID 	GAS 
Definite Volume	Definite Volume	No definite Volume
Definite Shape	No Definite Shape	No Definite Shape
are held tightly and packed fairly close together	are fairly close together with some attraction between them	have little attraction between them
- they are strongly attracted to each other	are able to move around in all directions	are free to move in all directions

Fluids



you could remember S T A M P

S - space between particles

T - Tiny particles

A - Attractive forces

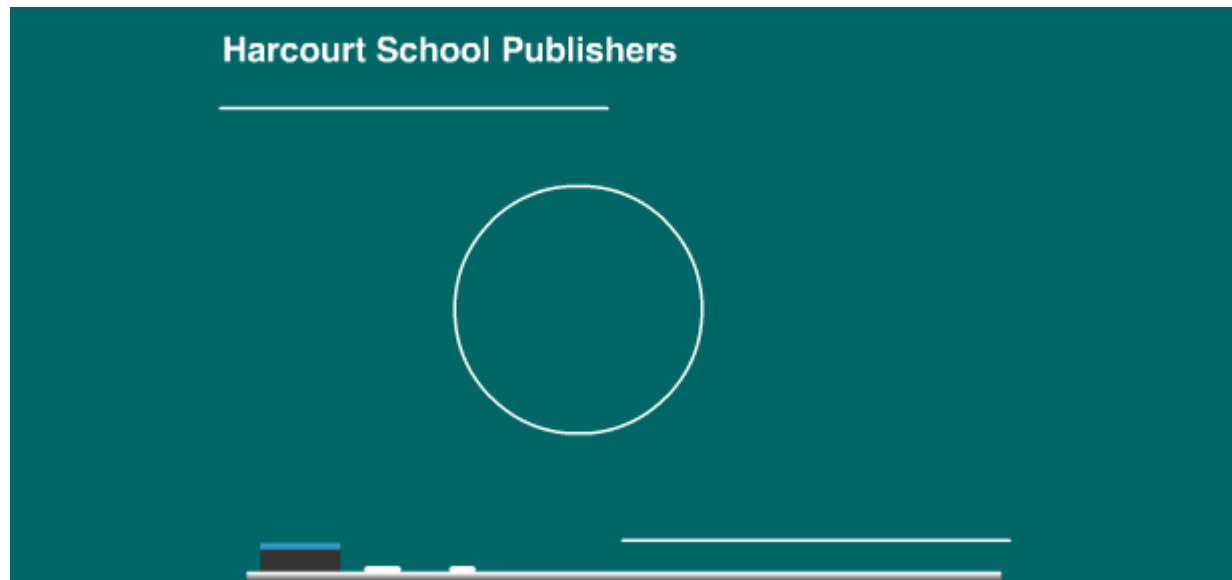
M – Moving

P - Pure substance particles same

Fluids



Solid, Liquid and Gas Particles Up Close



Fluids



Magic Mud Activity

- Page 269

Fluids



Student Questions

- Page 275
- 1,2

Fluids



Science 8

Unit 2: *Topic 2: Fluids*



Describing Fluids

- **Fluid** is anything that has no fixed shape and can flow



Questions:

Which states of matter can be classified as fluids?

Fluids



Can a Liquid be Classified as a Fluid?



Fluids



FIND OUT ACTIVITY

- MAGIC MUD



Fluids



Can a Gas be Classified as a Fluid?



Fluids



Can a Solid be Classified as a Fluid?



Fluids



Explain Why Solids That Flow Are Not Fluids.

- solids can appear to flow, especially when ground into very fine fragments or grains.
- Salt, for example, can be poured from one container to another and takes the shape of the box or saltshaker. However, if you look closely at such solids you will see that each fragment still has a definite shape.
- Solids form piles when poured; fluids do not. Imagine trying to make a pile of liquid water or a pile of oxygen!



Fluids



Fluid or Non Fluid

- List five fluid and Non fluids

Fluid	Non fluid

Fluids



Fluids Found in Your Home

Food Fluids	Cleaning Fluids	Bodily Fluids	Mechanical Fluids



Fluids

Fluids Found in Your Home

Food Fluids	Cleaning Fluids	Bodily Fluids	Mechanical Fluids
Syrup	Shampoo	Blood	Motor Oil
Honey	Detergent (liquid)	Mucous	Gasoline
Molasses	Vim	Urine	Hydraulic Fluid
Oil	Hand Soap	Sweat	

Fluids



Movie

- Fluids- Bill Nye



Aliant 

Fluids



Student Activity

- Can solids Flow, too? Page 271

Fluids



Student Questions

- Page 272
- 1,2,3,4,5

Fluids



Student Activity

- Fluids or Non- Fluid ===Page 265
- Worksheet on fluids

Fluids



Summary--Fluids

- Fluids are anything that flow
- Liquids and gas are fluids
- Solid can change state to become fluids

Fluids



Science 8

Unit 2:

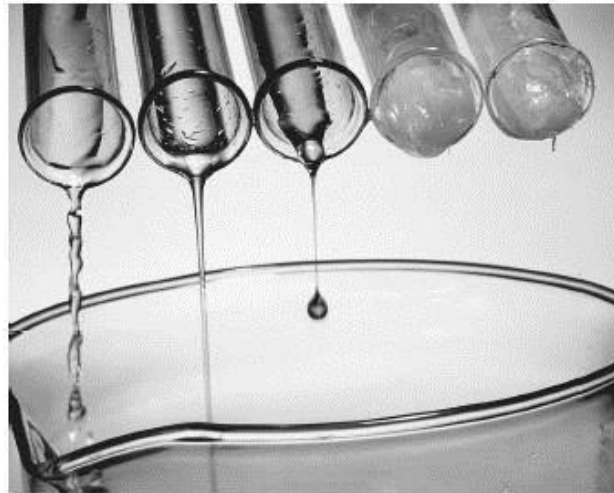
Topic 3: Viscosity and Flow Rate

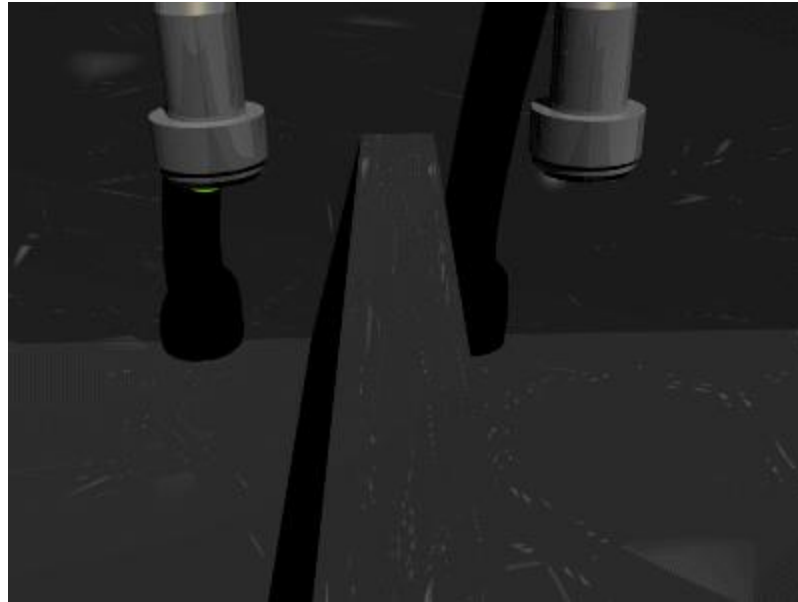


Viscosity

- **Viscosity** is a measure of a liquid's resistance to flow.

A thick liquid has a greater viscosity than a thin liquid. The thicker liquid is more resistant to flow. Therefore, it flows more slowly than a thinner liquid.





Which liquid has the highest viscosity?

Fluids



Thick and Thin Liquids

- Molasses and syrup have high viscosity



Water and milk and low viscosity



Fluids

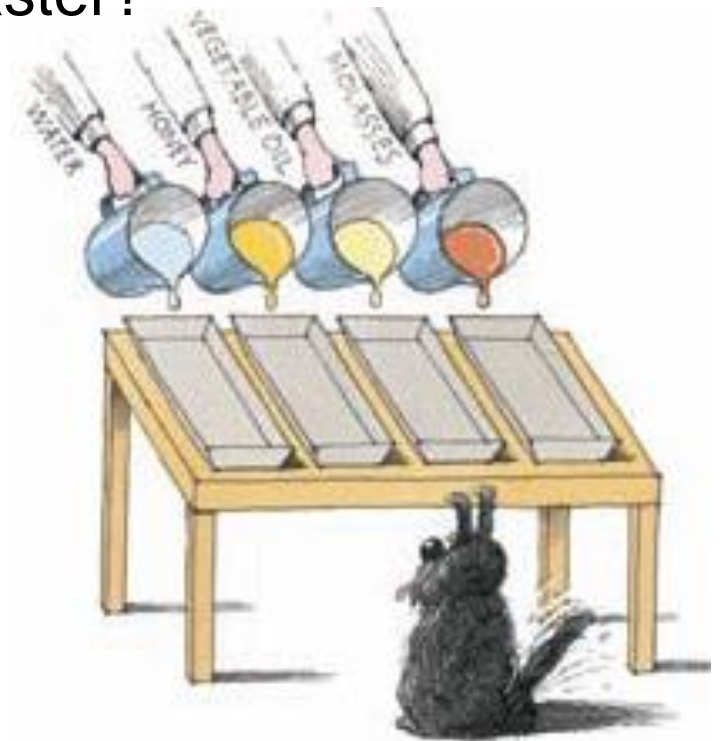


Flow Rate

Which liquid in the picture will flow faster?

Flow Rate refers to the speed at which a fluid flows from one position to another.

Fluids with a high viscosity have a low flow rate



Fluids



Student Activity

- Arrange the following fluids from low to high viscosity?

MOTOR OIL

HONEY

OXYGEN GAS

PAINT

MOLTEN LAVA

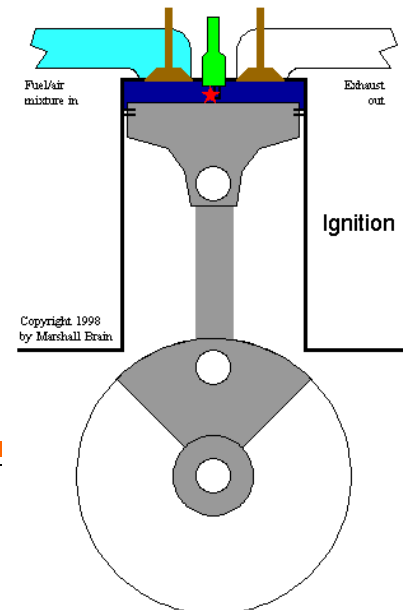
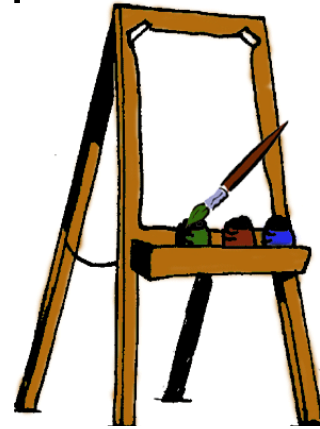
WATER

Fluids



Why Is Viscosity Important to Us?

- What would it be like to paint the walls of a room with paint that was too thick or thin. Paints require an appropriate degree of viscosity in order to spread properly.
- Motor Oil is used as lubrication for the moving parts of an engine. The viscosity must be high enough to maintain lubricating film, but low enough that the oil can flow around the engine parts satisfactorily to keep them well coated under all conditions.



Why are some More Liquid Viscous?

A liquid's viscosity is affected by the friction between the particles that make up the substance.

The greater the friction or rubbing of the particles in the fluid the higher the viscosity. The amount of friction between the particles can be impacted by:

- Size of particles
- Shape of Particle
- Attraction between particles



Student Activity

- The viscosity of liquids is an important property that must be measured very carefully in certain situations(ex Paints, motor oil, etc). Pick a product and explain why there is a need to closely regulate the viscosity.

Think about

- candy maker
- baker
- beekeeper,
- mason,
- painter

Fluids



Reading check

- Page 280

Fluids



Core Laboratory

The Flow Rate of Liquids (page 282)



Fluids



Reading Check

- Page 281
- #1, #2, #3, #4

Fluids



Factors Affecting Viscosity

1) Temperature:

Particles are constantly in motion. As they acquire more energy, they move faster and farther apart.

As a result, the viscosity decreases because there is less friction and the attractive force between particles is reduced.)

For example, when honey or wax is heated it flows faster (viscosity decreases)



Fluids

Liquids

heated → particles further apart → less attraction between particles → less friction → viscosity decreases

cooled → particles closer together → increased attraction between particles → more friction → viscosity increases

Gases

heated → particles further apart → particles move faster → more collisions, so more friction → viscosity increases

cooled → particles closer together → particles move slower → fewer collisions, so less friction → viscosity decreases

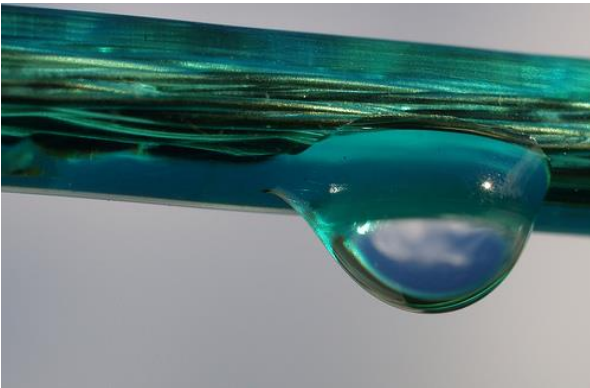
Fluids



2) Strength of Attraction between Particles

If the attractive forces between the particles of a liquid are strong, it is difficult for the particles to pull away from each other and slide past each other. The liquid flows slowly, and therefore has a high viscosity.

What if the attractive forces are weak?



Raindrop on a clothes line

There is attraction of water particles within the raindrop itself.

There is also attraction between the water particles and the particles of the object in the clothes line.



3) Concentration:

Concentration refers to the amount of substance in a given space. If a liquid is concentrated, it means that there are more particles in a given space. As a result, the viscosity increases because there is more friction and the attractive force between particles is increased.

For example, A chef is making gravy, he or she may thicken the gravy by adding cornstarch. By increasing the concentration of cornstarch, the chef is also increasing the viscosity of the gravy.



Reading Check

- Page 290
#3, #4, #5

Fluids



Science 8

Unit 2:

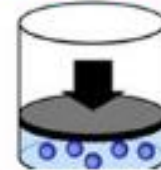
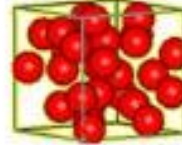
Topic 4: Density



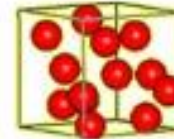
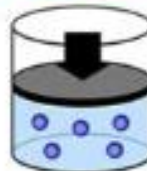
Density

- **Density** is the amount of mass in a certain unit volume of a substance

More Dense



Less Dense



Fluids



Density describes how closely packed together the particles are in a material

High density indicates that the particles are packed together closely.



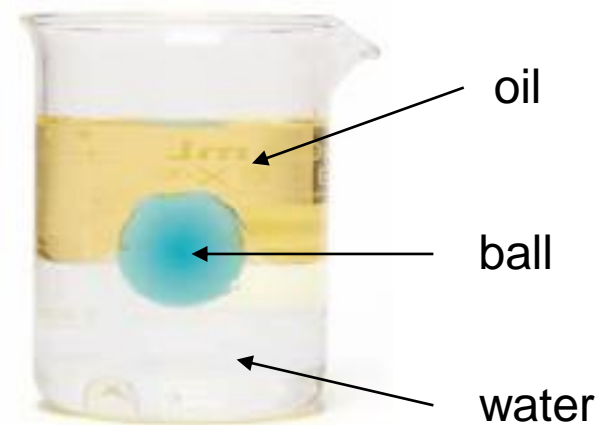
Fluids



How Can You Compare The Density Of Liquids?

- Fluids that do not mix, layer themselves according to their density.
- Less dense fluids “float” on top of more dense fluids.

Can you list the objects, in this beaker, from most dense to least dense?



Effects of Temperature on Density

The particle theory states that the particles of a substance spread out as they gain energy when heated. Hence, the particles take up more space, which means that the density of a substance decreases.

Greater the temperature => Less dense a substance becomes

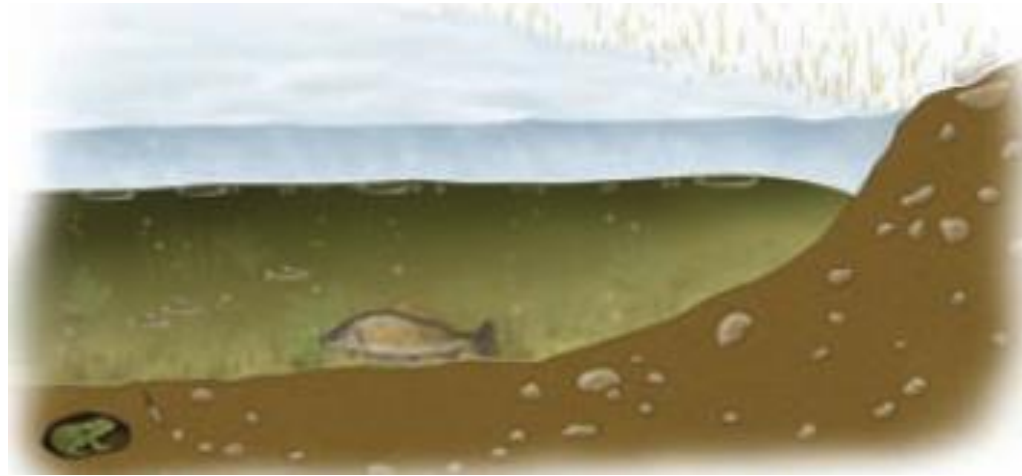
Cooler the temperature => more dense a substance becomes

A substance usually is more denser in its solid state

Fluids



Water Breaks the RULE



Most substances are denser in their solid form, water is an exception to this rule. When water freezes, the particles move slightly farther apart as they become fixed in position. This means that ice is actually less dense than liquid water, so it floats.

Fluids



Temperature and Density in Everyday Life



Warm versus cool
tire pressure



Hot air ballons

Fluids



Natural Change of Density



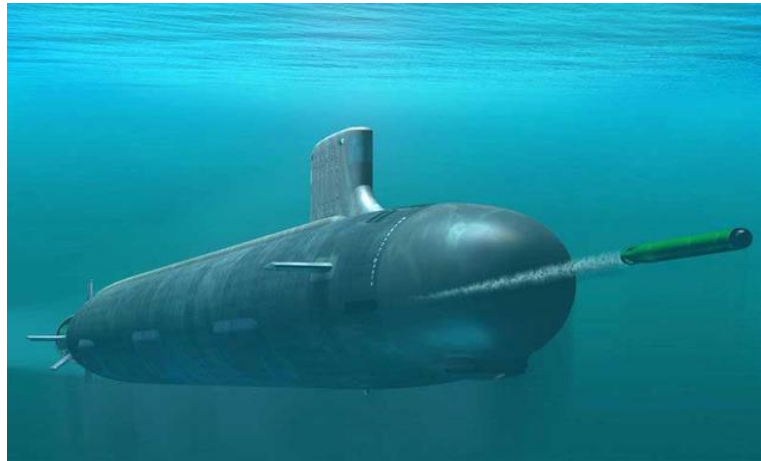
Drying of Wood



Fluids



Man Made Changes



Fluids



Measuring Density

- Both mass and volume are required when calculating density.
- **Mass:**
 - Mass can be measured using a scale or balance.
- **Volume:**
 - For objects that are block shaped, volume can be calculated by measuring the block and then using the equation:
$$\text{volume} = \text{length} \times \text{width} \times \text{height}.$$



balance



For objects with irregular shape displacement is the method used to find the volume:



Fluids



Calculating Density

Density can be calculated using the following formula:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

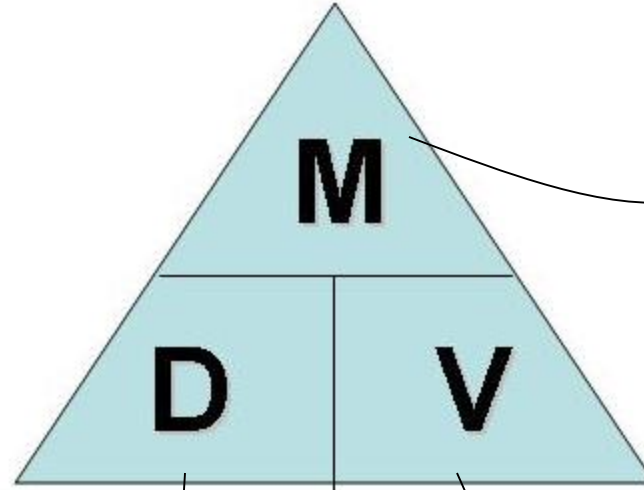
The mass units for solids, liquids, and gases are often grams (g) or kilograms (kg). If the object is a solid, the volume units are often cubic centimetres (cm³). For example, a density of 11 g/cm³. Water has a density of 1 g/mL. If the object is a fluid, the volume units are often millilitres (mL).

See next slide for the answers.

Fluids



$$M = DV$$



$$D = \frac{M}{V}$$

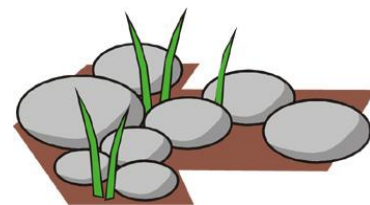
$$V = \frac{M}{D}$$

Fluids



Answer the following:

1. What is the density of a 4 cm^3 rock that has a mass of 24 g ?



1. A 5 ml sample of motor oil has a mass of 4.5 g . What is the density of the motor oil?



See next slide for the answers.

Fluids

See page 265

Complete the Chart

Substance	Mass (grams)	Volume (cm ³)	Density (g/cm ³)
Salt	20.00	9.26	
Gold	0.72		19.32
Wood π (Birch)		8.00	0.66

Fluids

