

Unit 2 – Fluids
Chapter 7
Outcomes #



Key Terms – Chapter 7

- boiling
- boiling point
- concentration
- condensation
- evaporation
- flow rate
- fluid
- freezing point
- gas
- liquid
- melting
- melting point
- solid
- solidification
- viscosity

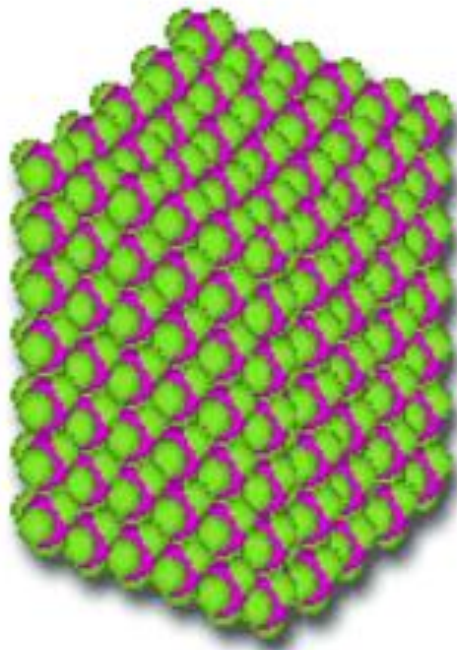
The Particle Theory of Matter (review)

1. All matter is made up of very tiny particles.
2. All particles in a pure substance are the same but different from another substance.
3. There is space between the particles.
4. The particles are always moving. They move faster if they gain energy.
5. There are attractive forces between the particles. Some strong; some weak.

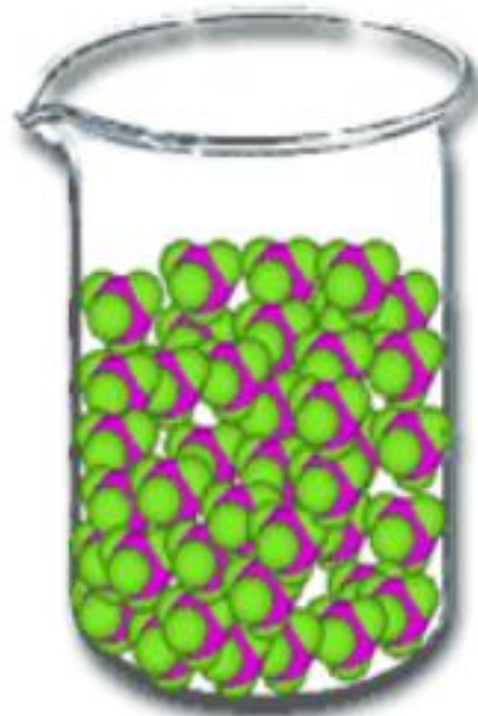
3 STATES OF MATTER... A REVIEW

State	Shape	Volume	Particle Arrangement	Particle Movement
Solid	Definite	Definite	Close	Vibrate
Liquid	Indefinite	Definite	Close	Free Flowing
Gas	Indefinite	Indefinite	Far Apart	Random

[Video Clip](#)



Solid



Liquid



Gas

FLUIDS

- Any form of matter that **flows**.
- **Liquids** and **gases** are fluids.
- **Solids** are NOT!

WE USE FLUIDS EVERYDAY...

- Food fluids (syrup)
- Cleaning fluids (water)
- Bodily fluids (blood)
- Industrial fluids (air in tires, lubricants)

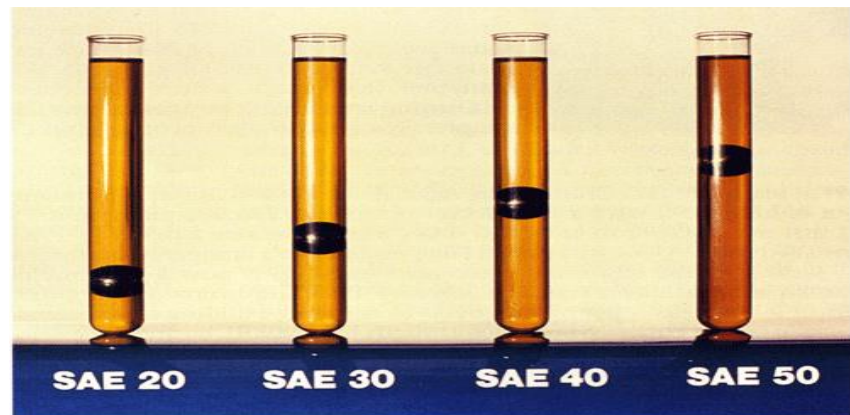
Can you name more?

VISCOSITY

- A measure of a fluid's **resistance** to flow.
- The *thickness* or *thinness* of a fluid.
- A fluid that is viscous is the one that is **NOT** “runny” (flows slowly).

VISCOSITY & *FRICTION*

- **Friction** resists movement.
- The greater the friction between particles, the **greater** the viscosity.



Steel balls of equal weight dropped into test tubes filled with motor oils fall at different rates. Their rate of fall depends on the viscosity of the oil. The ball travelling through the light SAE 20 oil has travelled farthest, while the ball in the heavy SAE 50 has travelled least.

Viscosity is important in our everyday lives.

Example: The thickness or thinness of our pancake batter or motor oil in our skidoos

- Number the fluids below with 1 being the least viscous and 4 being the most viscous.



FLOW RATE

- The speed at which a fluid flows **from one point to another.**

Examples:

Slow

Corn syrup

Medium

Dish liquid

Fast

Water

Comparing viscosity and flow rate

Viscosity	Flow Rate	Description
High	Slow	Thick
Low	Fast	Runny

FACTORS THAT AFFECT VISCOSITY

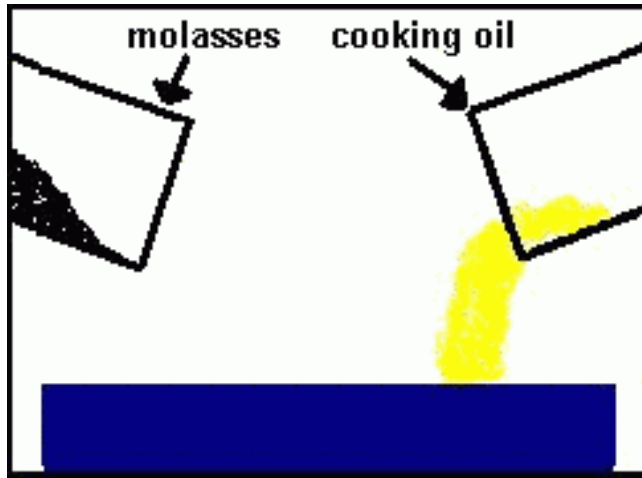
1. Temperature:

- As you **increase** temperature, you **decrease** a fluid's viscosity. As you **decrease** temperature, you **increase** a fluid's viscosity.

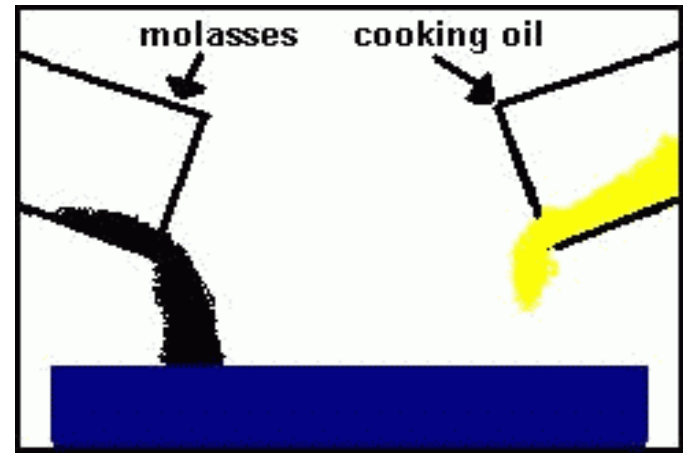
Example: As the temperature of molasses is increased it flows faster: Low viscosity!

- *(PTM: particles are constantly in motion. As they acquire more energy, they move faster. As liquids are heated the particles move faster and further apart).*

➤ *The **opposite** is true of gases.*



At room temperature



As the temperature of molasses is increased it flows faster: low viscosity

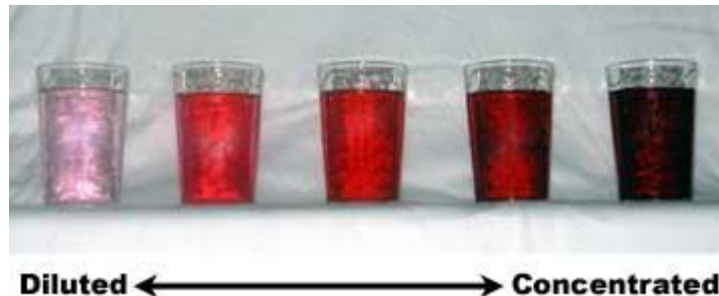
As the temperature of cooking oil is decreased it flows slower: high viscosity

2. Concentration:

- The **amount** of a substance dissolved in a specific volume.
- **Increasing** the concentration, **increases** the viscosity.
- *(PTM: There is empty space between the particles).*

Example:

Skim milk → 1% milk → 2% milk → whole milk → cream



3. Attractive Forces:

- If the attractive forces are **strong**, it is difficult for the particles to pull away, therefore the fluid flows **slowly** and is **more viscous**.
- Can stick to each other or the container
- *(PTM: There is a force of attraction between particles that can be either strong or weak).*

4. Particle size:

- The **smaller** the particle size, the **faster** the fluid flows and is **less** viscous.

- Core Lab #3: Flow rates of liquids
- Core STSE: Cleaning Fluids