2. Newtonian and Non-Newtonian liquid

Newtonian fluids have a constant viscosity, meaning their resistance to flow remains the same regardless of the applied force or shear rate. Non-Newtonian fluids, on the other hand, exhibit a viscosity that changes depending on the applied force or shear rate, such as ketchup thinning when shaken.

Newtonian Fluids:

- **Constant Viscosity:** Their resistance to flow remains the same regardless of the applied force or shear rate.

  Examples: Water, air, motor oil.

- **Follow Newton's Law of Viscosity:** This law states that the shear stress is directly proportional to the rate of shear strain, which is the fluid's resistance to flow.

Non-Newtonian Fluids:

- **Variable Viscosity:** Their resistance to flow changes depending on the applied force or shear rate.

  Examples: Ketchup, yogurt, mayonnaise.

- **Do not follow Newton's Law of Viscosity:** Their viscosity changes with applied stress.

Types:

- **Shear-thinning:** Viscosity decreases with increasing shear rate (e.g., ketchup thinning when shaken).
- **Shear-thickening:** Viscosity increases with increasing shear rate (e.g., quicksand).
- **Thixotropic:** Viscosity decreases over time under constant shear stress (e.g., paint thinning when stirred).
- **Rheopectic:** Viscosity increases over time under constant shear stress (e.g., some gels).

Key Differences:

Feature	Newtonian Fluids	Non-Newtonian Fluids
Viscosity	Constant	Variable
Shear Stress	Directly proportional to shear strain rate	Not necessarily proportional to shear strain rate
Examples	Water, air, motor oil	Ketchup, yogurt, mayonnaise

Behavior	Follows Newton's Law of Viscosity	Does not follow Newton's Law of Viscosity