



Newtonian and Non-Newtonian Fluids

Newton gave Newton's law of viscosity, the fluid which follows Newton's law of viscosity is called Newtonian fluid and which does not follow Newton's law of viscosity is called non-Newtonian fluids. In today's life you witnessed some and now also you witness some Newtonian fluids and non-Newtonian fluids. Fluids like motor oil, water etc. are Newtonian fluids and fluids like toothpaste, butter etc. are non-Newtonian fluids.

NEWTONIAN FLUIDS: Newton's law of viscosity states that "viscosity is not dependent on shear; that is viscosity is independent whatever the shear state is". Fluids that follow Newton's law are called Newtonian fluid. A Newtonian Fluid will take the form of its container in which it is kept. In this law, Newton gave a linear relationship between shear stress and shear rate.

CHARACTERISTICS OF NEWTONIAN FLUIDS:

Some important characteristics of **Newtonian Fluid** is:

- **Newtonian fluids** are non-compressible.
- **Newtonian fluids** are unreactive.
- **Newtonian fluids** are isotropic.
- At fixed temperature, **Newtonian fluids** viscosity doesn't change.
- **Newtonian fluid** follows Newton's law of viscosity.

A Non-Newtonian fluid is a fluid that when it comes under stress, its flow viscosity, and flow behavior changes. When force is applied to such fluids, then stress can cause them to get thicker so that it will act like a solid, or in some cases it acts exactly opposite behavior and may increase in their running behavior. When stress is removed and leaves the fluid still, it will return to its earlier state.

Non-Newtonian fluids are classified into four types depending upon:

- Viscosity or Measuring fluids internal resistance to flow.
- Change in fluid characteristics with respect to time.
- Change in fluid characteristics with respect to magnitude of applied shear rate.

