Newtonian fluid

THOUGH MOSTLY CORRECT I DOUBT WHETHER YOU UNDERSTOOD WHAT YOU WERE WRITING. I HAVE SIMPLIFIED THE FIRST PARAGRAPH FOR YOU FOR BETTER UNDERSTANDING

This article was checked by pedagogue

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Suggested reviewer: Carmeljcaruana

Viscosity can be defined more simply as a resistance to flow of a fluid. 'Thin' liquids such as water, flow easily and therefore have a low viscosity as there is little resistance to flow, whereas thicker liquids such as BLOOD flow less easily and therefore have high viscosity as there is a high resistance to flow. The higher the viscosity, the harder it would be to stir it. For A NEWTONIAN fluid (like water) the viscosity wouldn't depend on how fast you were stirring it, but for a non-Newtonian fluid it would. Depending on the non-Newtonian fluid, it could get easier or harder when you tried to go faster.

Newtons law of viscosity states that shear stress is directly proportional to the velocity gradient and can be defined as

$$O=\gamma\eta$$

where O=shear stress, γ=shear rate and η= Newtonian viscosity

Shear stress is defined as the force per unit area and can be expressed by the equation:

$$T=F/A$$

where T=Shear stress, F =Force applied and A= Cross sectional area of material with an area parallel to the applied force vector.

Shear rate is the rate at which a shearing deformation is applied to some material. The equation for simple shear is defined by the equation:

$$\gamma=v/h$$

Where γ= shear rate, measured in reciprocal seconds, v=velocity of the moving plate, measured in meters per second and h=distance between the two parallel plates, measured in meters.

Viscosity can be affected by pressure, temperature and compositions. An element of a flowing liquid or gas will suffer forces from the surrounding fluid, including viscous stress forces that cause it to gradually deform over time. The defining factor of any Newtonian fluid is that it will flow the same when any great deal of force is applied as when it is left alone. An example of a Newtonian fluid is water. Water flows the same way whether or not it has be vigorously agitated. Also, water has a linear relationship between the viscosity and shear stress, which means that the viscosity will not change regardless of the shear stress applied.

The viscosity of a Newtonian fluid can change through other factors besides externally applied force, such as temperature or pressure. Liquids that can be compressed will generally become thicker under pressure, whereas incompressible liquids will show very little change when compressed. When exposed to extreme temperatures, these liquids can change density. However, despite the change in viscosity through these methods, there will still be a linear relationship between viscosity and shear stress. This means that they can still be defined as a Newtonian fluid.

Bibliography: http://www.wisegeek.org/what-is-a-newtonian-fluid.htm http://www.wisegeek.org/what-is-viscosity.htm http://www.chemavishkar.com/2013/04/newtons-law-of-viscosity-newtonian.html