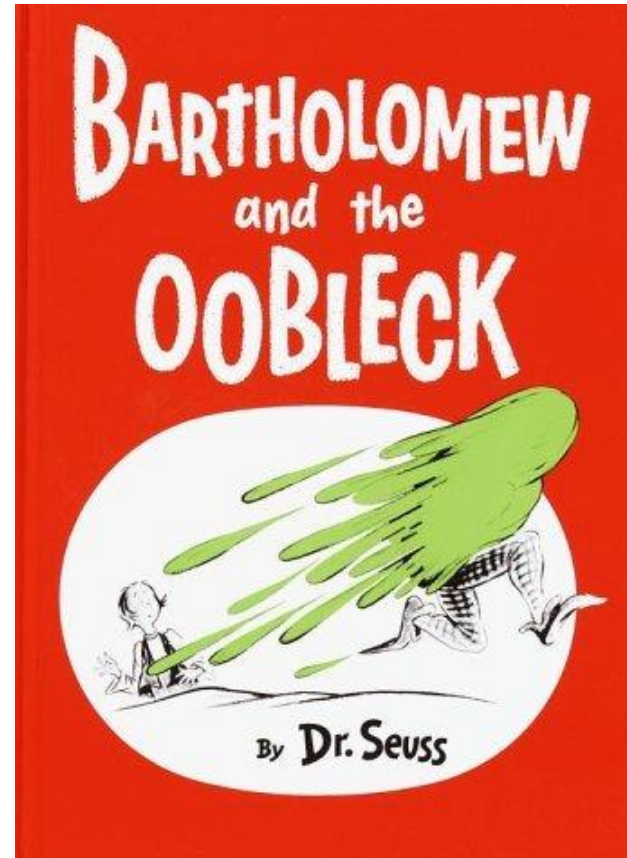
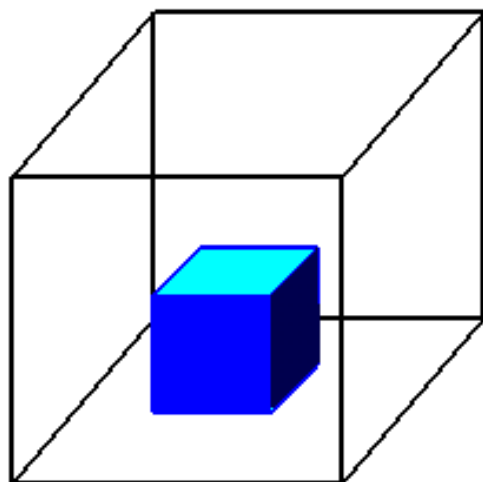

oobleck!



Viscosity and Non-Newtonian Fluids



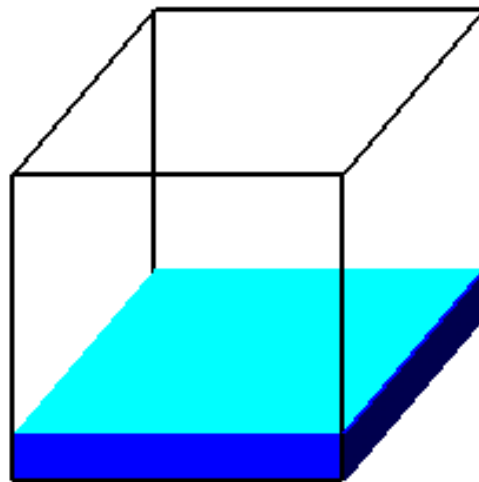
States of Matter



Solid

Holds Shape

Fixed Volume

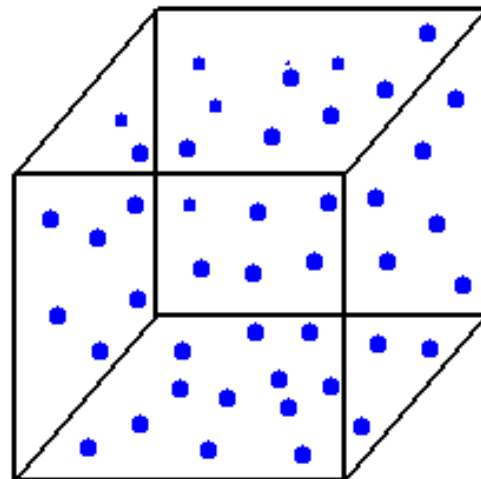


Liquid

Shape of Container

Free Surface

Fixed Volume



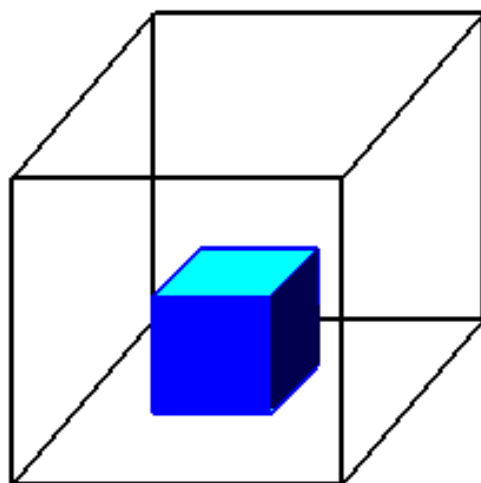
Gas

Shape of Container

Volume of Container



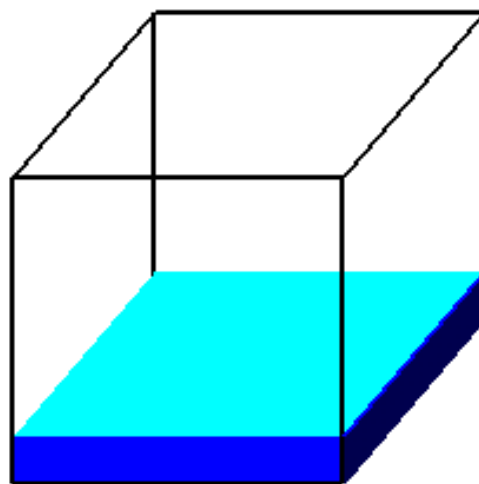
States of Matter



Solid

Holds Shape

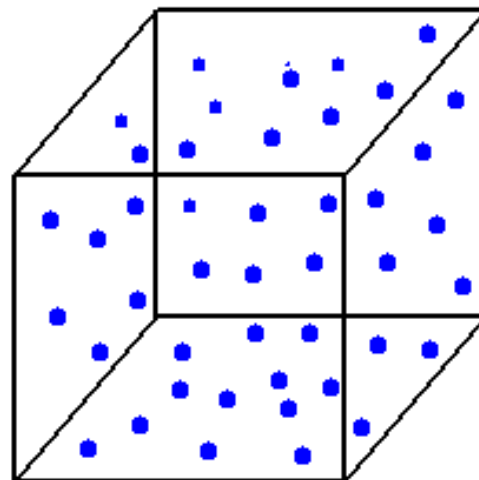
Fixed Volume



Liquid

Shape of Container
Free Surface

Fixed Volume



Gas

Shape of Container

Volume of Container

states of matter can change shape

states of matter can change shape

DEFORMATION

Which state of matter is the *most* deformable?

Which state of matter is the *least* deformable?

Which state of matter is in the *middle*?

states of matter can change shape

DEFORMATION

Which state of matter is the *most* deformable?

Which state of matter is the *least* deformable?

Which state of matter is in the *middle*?

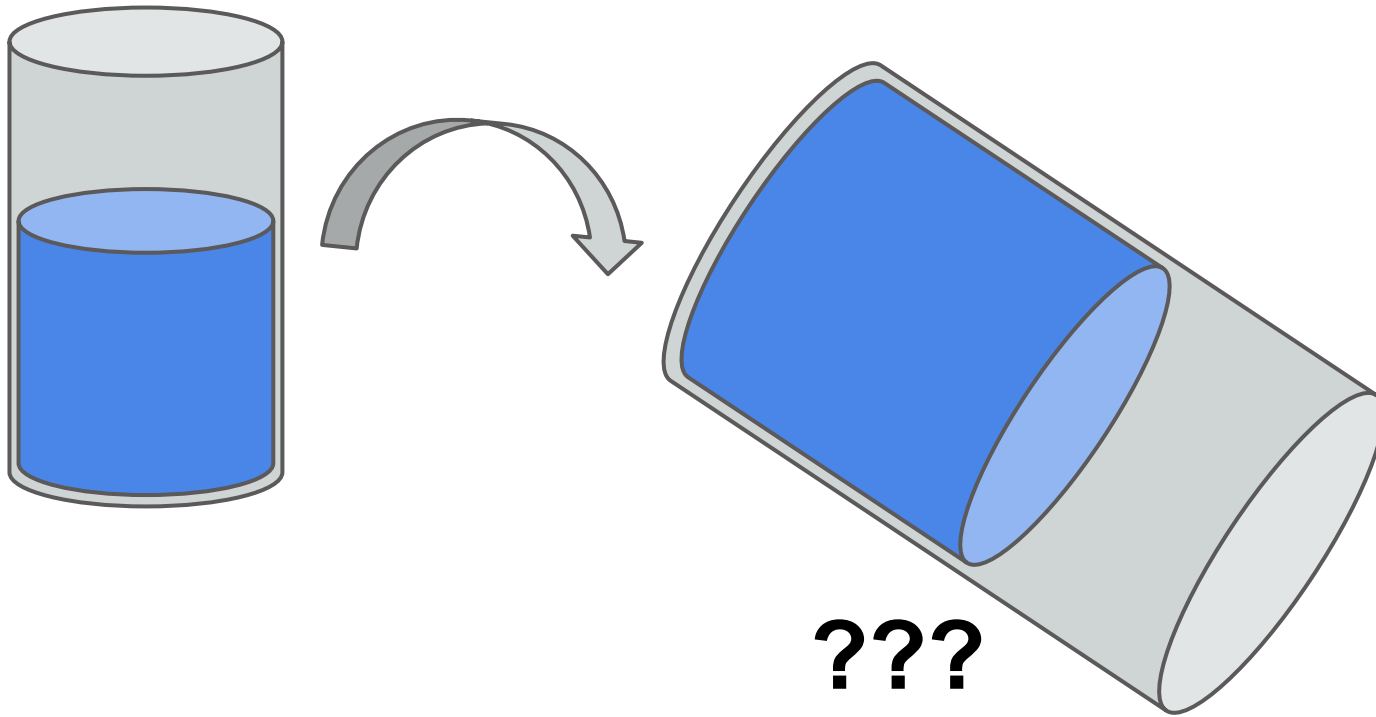
Liquids!

Viscosity

Measure of a liquid's resistance to deformation

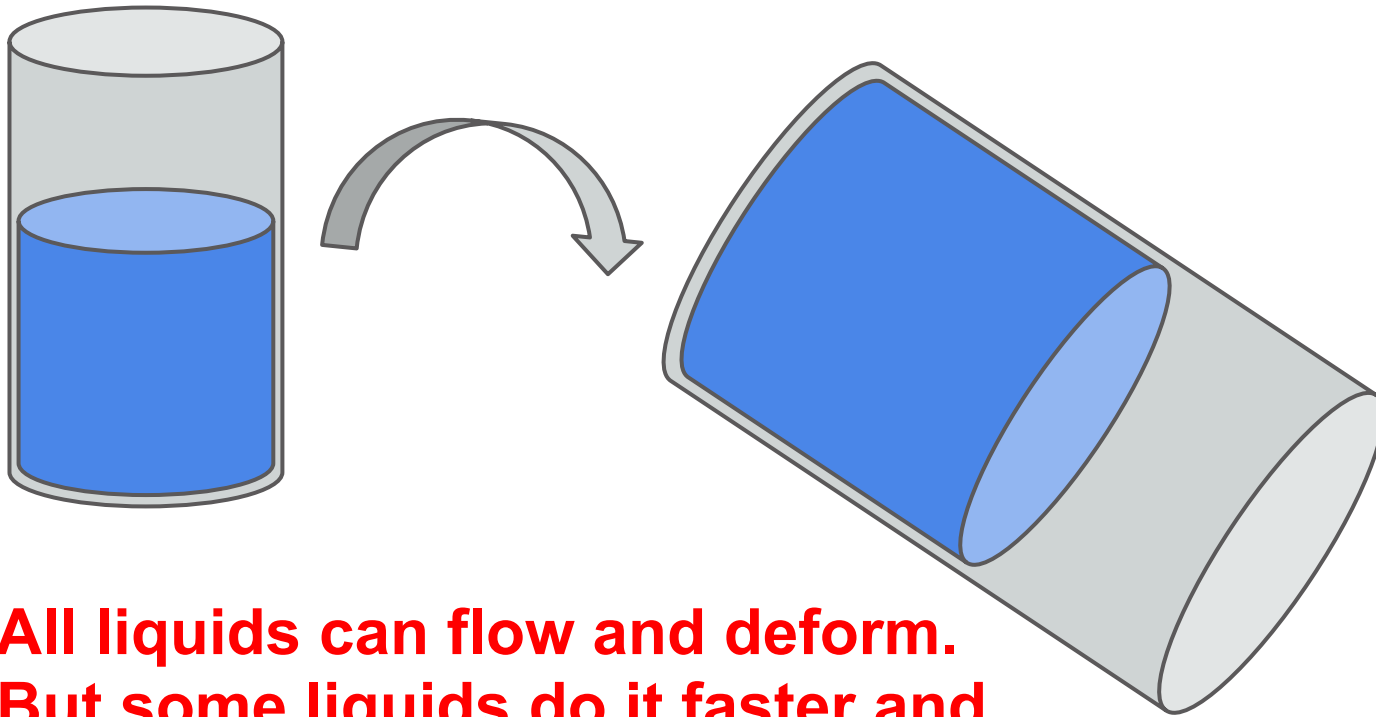
Viscosity

Measure of a liquid's resistance to deformation



Viscosity

Measure of a liquid's resistance to deformation



**All liquids can flow and deform.
But some liquids do it faster and
more easily than others.**

Which has a higher viscosity?

Water or honey?

A liquid that flows slower, or
a liquid that flows faster?

A liquid that changes its shape easily, or
a liquid that does not want to change its shape?

A liquid that is easier to deform, or a liquid that
is harder to deform?

Which has a higher viscosity?

Water or honey?

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Newtonian Fluids

A **Newtonian fluid** is a fluid that has the *same viscosity* when stronger or weaker forces are applied.

Newtonian Fluids

A **Newtonian fluid** is a fluid that has the *same viscosity* when stronger or weaker forces are applied.

A **Non-Newtonian fluid** is a fluid whose *viscosity changes* when stronger or weaker forces are applied.

Newtonian or non-Newtonian?

A liquid that becomes harder to deform when a stronger force is applied. (Silly Putty)

A liquid that becomes easier to deform when a stronger force is applied. (Honey)

A liquid that becomes easier to deform when it is heated up. (Maple syrup)

A liquid whose viscosity does not change. (Water)
