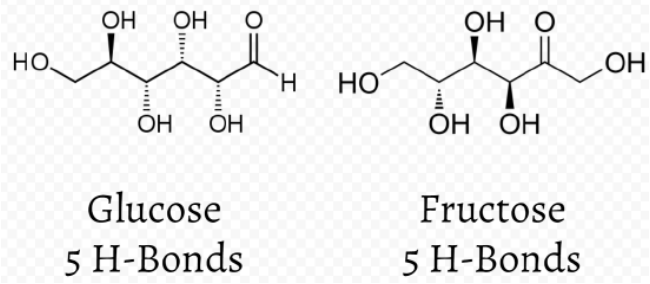
10.7: Viscosity

Because its molecules can slide around each other, a liquid has the ability to flow. The resistance to such flow is called the **viscosity**. Liquids which flow very slowly, like glycerin or honey, have high viscosities. Those like ether or gasoline which flow very readily have low viscosities.

Viscosity is governed by the strength of intermolecular forces and especially by the shapes of the molecules of a liquid. Liquids whose molecules are polar or can form hydrogen bonds are usually more viscous than similar nonpolar substances. Honey, mostly glucose and fructose (see image below) is a good example of a liquid which owes its viscosity to hydrogen bonding.



Liquids containing long molecules are invariably very viscous. This is because the molecular chains get tangled up in each other like spaghetti—in order for the liquid to flow, the molecules must first unravel. Fuel oil, lubricating grease, and other long-chain alkane molecules are quite viscous for this reason. Glycerol, $CH_2OHCHOHCH_2OH$, is viscous partly because of the length of the chain but also because of the extensive possibilities for hydrogen bonding between the molecules. The video below shows several different long chained oils, each progressively more viscous.

The viscosity of a liquid always decreases as temperature increases. As the molecules acquire more energy, they can escape from their mutual traction more readily. Long-chain molecules can also wriggle around more freely at a higher temperature and hence disentangle more quickly. Below is a video that demonstrates this effect with a household liquid: honey. As a warning, the video has **loud** background music.