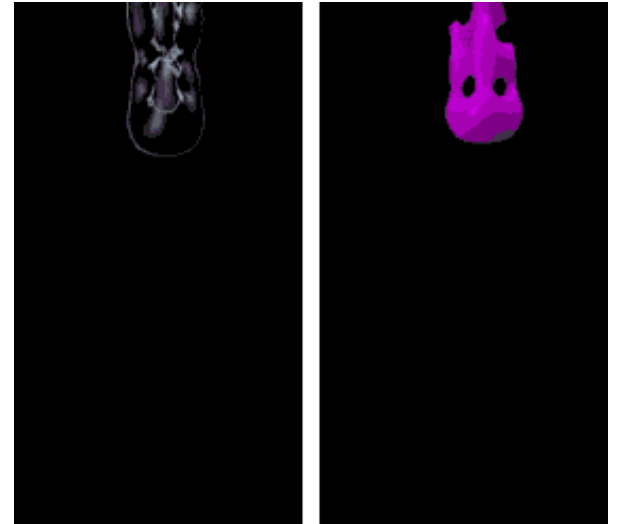


Viscosity, Adhesion, and Cohesion

Lesson 28

Viscosity

- What do gooey caramel topping or pancake syrup have in common?
 - Some of the most delicious treats are liquids that flow thickly and smoothly
- The property of thickness or thinness in a fluid is called **viscosity**
- **Viscosity** is the resistance of a fluid to flow
 - The slower a fluid flows, the greater the viscosity

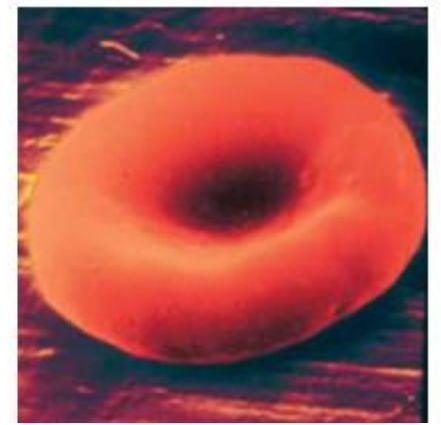
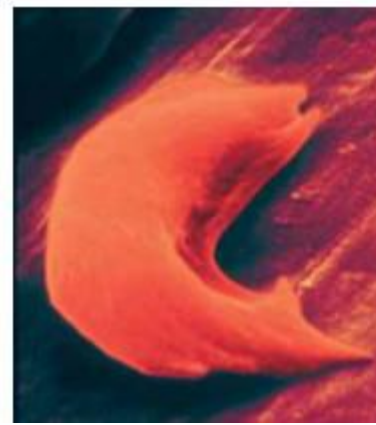
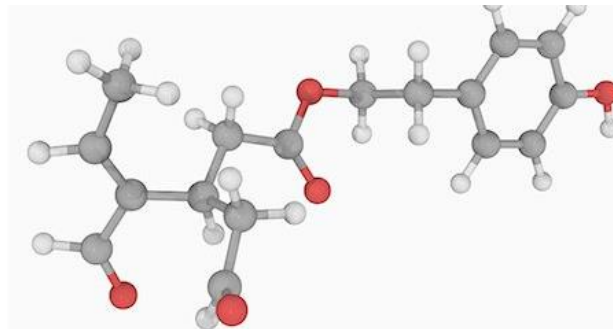
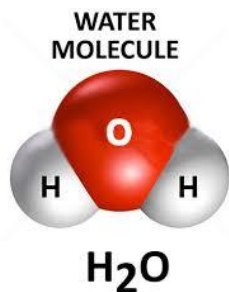


Viscosity

- Some fluids flow more easily than others

Factors that can affect how easily a fluid flows:

- Particles come in different shapes and sizes
 - Some particles can flow past each other with greater ease than other particles
- The force of attraction between particles
 - Some fluids are attracted more strongly to each other than other fluid particles



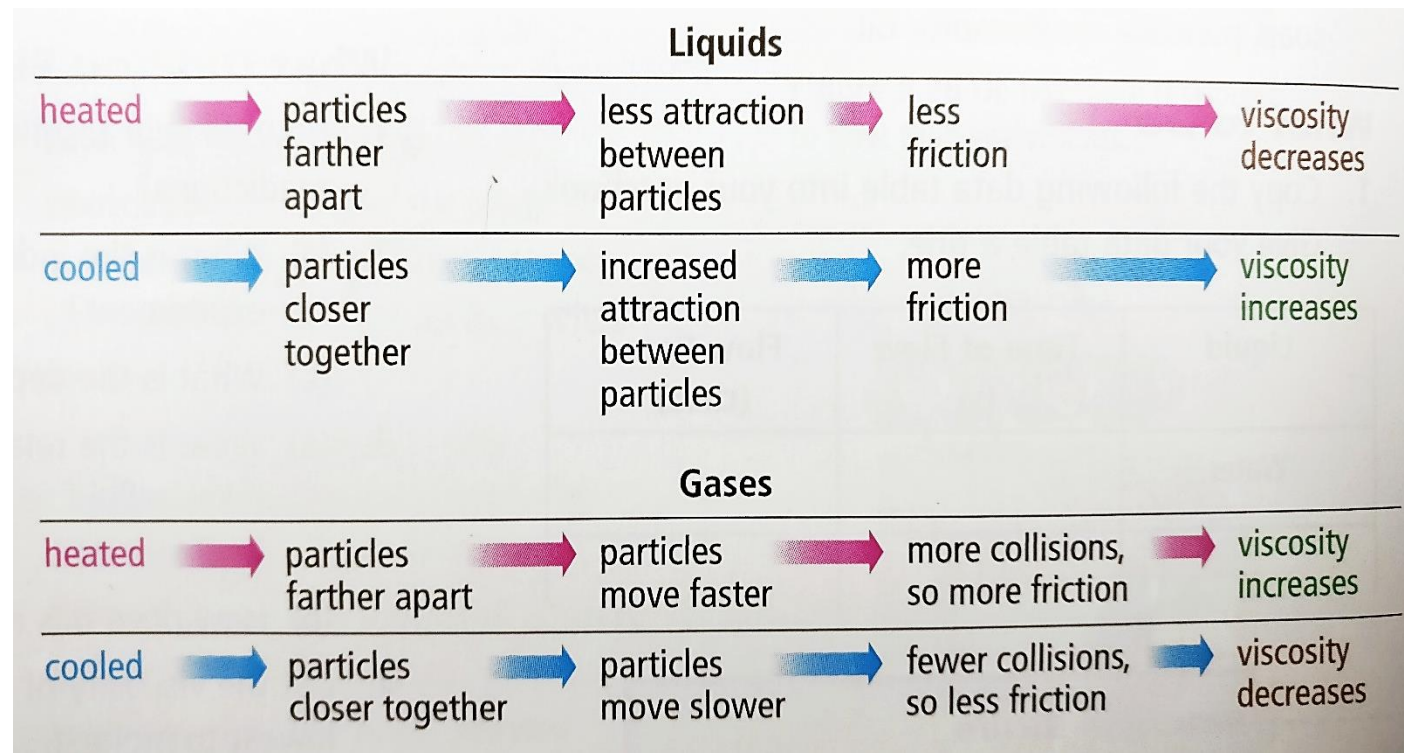
Viscosity

- We can compare the viscosity of different fluids by comparing their *flow rates*
- The **flow rate** is the speed at which a fluid flows from one point to another



The effect of temperature on viscosity

- All fluids can flow, but viscosity plays a bigger role in liquids than in gases
 - Due to the distance between the particles
- Because of the movement of particles and the spaces between particles in gases and liquids, temperature has an effect on viscosity

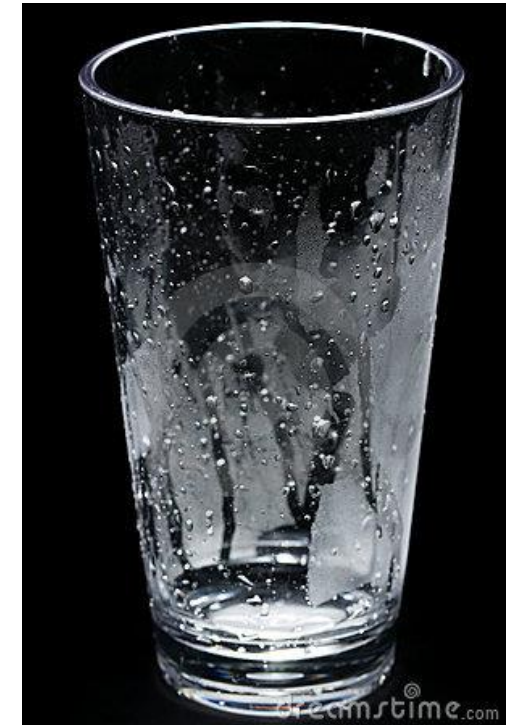


Adhesion

- Adhesion is another property of fluids that can affect their flow
- **Adhesion** is attraction or joining of two different objects or fluids to each other
 - Fluids are sometimes attracted to surfaces and stick to them

Examples: water out of a glass

- You can shake the glass vigorously, but there are always a few drops that stick to the glass



Cohesion

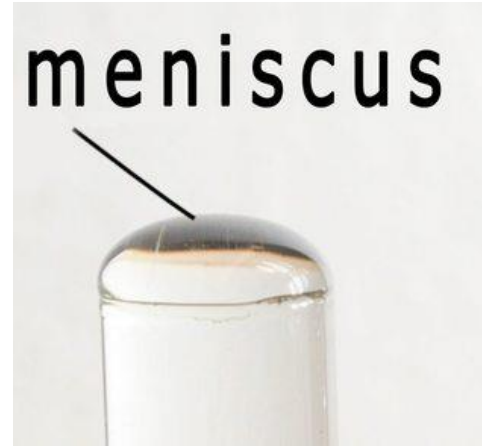
- The attraction that binds water to other surfaces also works to attract water to itself
- **Cohesion** refers to the strength with which the particles of an object or fluid attract each other
 - Particles of the same substance are attracted



Cohesion example

- Water molecules attract one another at the water's surface
 - This cohesion forms a surface tension
- **Surface tension** is a property of a liquid where the surface of the liquid acts like a thin skin or membrane
 - Can be great enough to support objects that would normally sink in water because of their differences in density
- Insects, like the water strider, can walk on water supported by the tension formed by the attraction between water molecules

meniscus



Summary

- **Viscosity** is a description of a fluid's resistance to flow
 - When the viscosity of a fluid decreases, its flow rate increases
 - Viscosity of different fluids can be compared by looking at flow rate
 - The viscosity of a liquid decreases as it is heated
 - The viscosity of a liquid increase as it is cooled
 - The viscosity of a gas increases as it is heated
 - The viscosity of a gas decreases as it is cooled
- Flow rate is also affected by **adhesion** and **cohesion**
 - **Adhesion** = the attraction or joining of two different objects r fluids to each other
 - **Cohesion** = the strength with which particles of the same substance/object are attracted to each other

Check your understanding!

1. How is flow rate related to viscosity?
2. What is the effect of temperature on viscosity in liquids? In gases?
3. What is the difference between adhesion and cohesion?
4. Why do fluids adhere (stick to) certain surfaces?

Answer the above four questions. To be handed in next class!