1. The molecules in a gas are at random motion. Therefore a gas has neither a definite shape nor a definite volume A liquid has a definite volume but not a definite shape. assumes the shape of the container.

2. The molecules in a gas are far apart from one anothe Hence, gases are readily compressed. The molecule in a liquid are much more closer than those in a gas Therefore, liquids are much less compressable than gases.

3. A liquid is far denser than a gas.

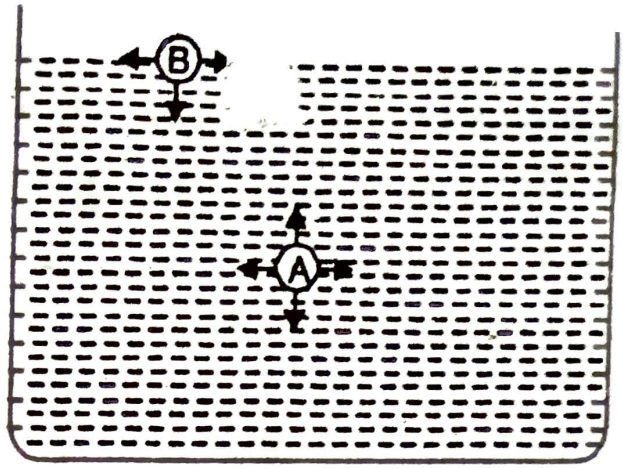
4. There is no appreciable forces of attraction between the gas molecules. The molecules in a liquid are held together by strong attractive forces. These are about 10 times as strong as those in gases.

5. Liquids have a surface of separation. This is not present in gases.

Surface tension

Surface tension is the forced experienced by the molecules present in the surface of a liquid. A molecule in the bulk of the liquid is attracted equally in all directions by the neighbouring

molecules and hence the net pull on the molecules is zero. However, a molecule on the surface of the liquid is partially surrounded by other molecules and experiences a net downward pull. This downward force acting on the surface of a liquid is called *surface tension.* It is defined as *the force in dynes at right angles on the surface of a liquid one centimeter length.* The unit of surface tension is dynes / cm (CGS System) or Newton / metre (SI System).



Liquid	*S.T. in dynes / cm*
Water	73.5
Benzene	29.3
Alcohol	21.7

Effects of surface tension

1. Surface tension tends to reduce the surface area of a liquid. Hence, drops of a liquid or bubbles of a gas are spherical in shape.
2. The rise of a liquid in a capillary tube (e.g. rise of water or sap in plants, rise of underground water to the surface of earth) is due to the effect of surface tension.
3. As a consequence of surface tensions, the vapour pressure of a liquid is greater when it is in the form of small droplets than when it has a plane surface.
4. The cleansing action of soap is due to the lowering of interfacial tension between water and grease.

Viscosity

The molecules in a liquid are arranged in a series of thin parallel layers moving one over the other. They move with different velocities. The movement of one layer is opposed by its adjacent layer. This internal resistance flow or force of friction is called "viscosity". It may be defined as *the force of friction between two layers of a liquid moving one over the other with different velocities.*

The coefficient of viscosity may be defined as *the force per unit area required to maintain a unit velocity difference between two layers of unit distance apart.* The unit of viscosity coefficient is *poise.*

1 poise = 1 dyne cm^{-2} se^{-1} (CGS System)
1 poise = 1 newton m^{-2} sec^{-1} (SI System)

Trouton's rule: The ratio of the molar heat of vapourisation of a liquid to its normal boiling point in absolute scale is a constant which is approximately equal to 21 cals or 88 J deg^{-1} mol^{-1}.

$$\frac{\Delta H_v}{T_b} \approx 21 \text{ cals } deg^{-1} \text{ } mol^{-1}$$

$$\approx 88 \text{ J } deg^{-1} \text{ } mol^{-1}$$

Application: Trouton's rule is applicable only to normal liquids such as benzene. It is not obeyed by associated liquids like water and alcohol. Thus, Trouton's rule is useful to find out the nature of liquid, whether normal or associated.

Problem: The latent heat of vapourisation of water is 540 calories per gram. Find the Trouton's constant for water. What information do you get from the result?