

Why water molecule has angular structure?

## ANGULAR GEOMETRY of Water Molecule

According to VESPER theory, water molecule has angular geometry with a bond angle of  $104.5^\circ$ . This theory states that:

“Electron pairs around central atom arrange themselves in such a way so as to minimize repulsions between them, thus determining the molecular geometry.”

In case of water molecule, there are two bond pairs and two electron pairs. There are two lone pairs on oxygen atom. Water has angular structure due to the fact that repulsion from lone pair combination is more than bond pair repulsion. Additionally, the

existing electron pairs exist in different planes. One lie below the plane and other lies above the plane. This leads to distorted tetrahedron structure of water molecule with bond angle of  $104.5^\circ$  which falls short of the true  $109^\circ$  of tetrahedral geometry.



Water is a triatomic molecule that is expected to be  $AB_2$  type linear molecule like  $CO_2$ . But VSEPR theory successfully justifies its angular geometry by arguing the participation of lone pairs in addition to bond pairs in determining its geometry.

Oxygen's Electronic Configuration =  $1s^2, 2s^2, 2p_x^2, 2p_y^1, 2p_z^1$

Two of the corner molecules of a tetrahedron are occupied by each of two lone pairs and remaining by ~~po~~ bond pairs owing to spatial arrangement of lone pairs and their repulsive action among themselves and on bond pairs, the bond angle is further reduced to  $104.5^\circ$ .

# Discuss the structure and function of brain in detail.

Brain is a complex organ that acts as a control centre of a nervous system in animals as well as human beings. It is responsible for all cognitive functions. The structure of human brain is intricate that is divided into different regions.

## Structure of Human Brain

There are three main parts of human brain :

1- Cerebrum

2- Cerebellum

3- Brainstem

- 1) Cerebrum : This is the largest part of human brain that is further divided into two hemispheres that is left hemisphere and right hemisphere. Each hemisphere is further divided into four lobes i.e. Frontal lobe, parietal lobe, occipital lobe and temporal lobe.

→ **Functions of Cerebrum**: Cerebrum is responsible for:

- Determining personality of a person

- Determining intelligence of a person

- Thinking

- Reasoning

- Planning and organizing of information

→ **Functions of four lobes of Cerebrum**

**Frontal lobe**: Frontal lobe is associated with voluntary movements, problem-solving processes of brain.

**Parietal lobe**: Parietal lobe is responsible for processing sensory information like touch, pain, temperature.

**Occipital lobe**: This lobe is responsible for processing visual signals.

**Temporal lobe**: This lobe is responsible for auditory processes like memory and emotion.

2) Cerebellum :- This part is located below the cerebrum of human brain.

Function of Cerebellum:

Cerebellum coordinates gait and maintains posture of human body. It controls muscle tone and muscle movements. Any damage to this part of human brain leads to inability of a person to maintain his body posture.

3) Brainstem: Brainstem connects the cerebrum of brain to the spinal cord and cerebellum. It is further divided into three parts:

- i) Medulla Oblongata
- ii) Pons
- iii) Mid brain

Functions of brainstem: Brainstem is responsible for these functions of human body:

- i) Breathing
- ii) Controlling Heart beat
- iii) Digestion

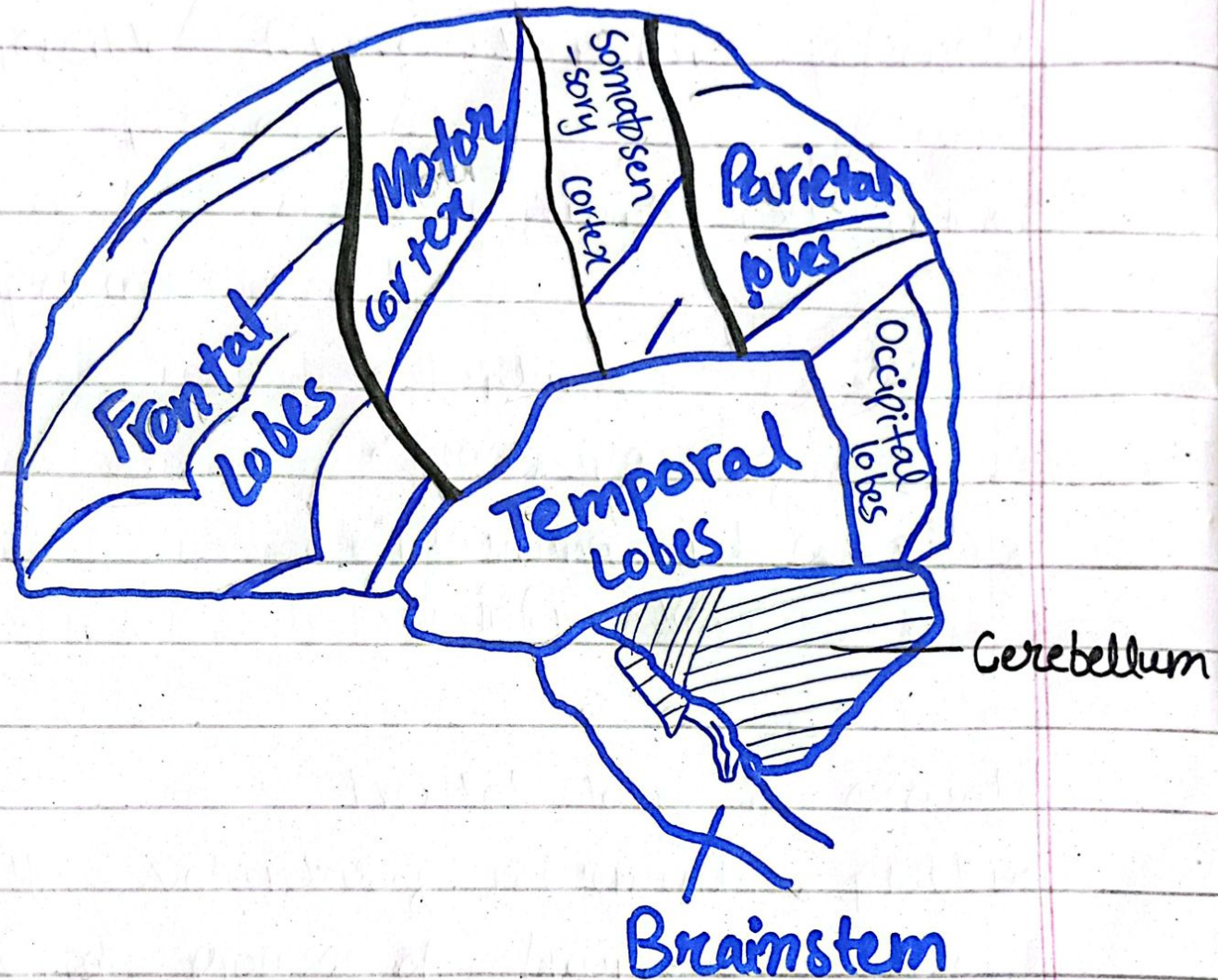


Figure: Structure of Brain