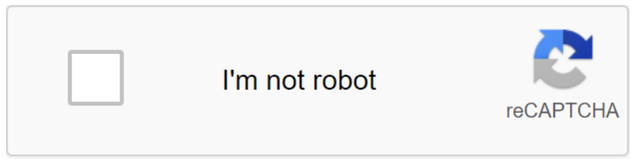

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Vsepr theory pdf class 11

The VSEPR theory is used to predict the shape of molecules from pairs of electrons that surround the central atoms of the molecule. The theory was first introduced by Sijvik and Powell in 1940. The VSEPR theory is based on the assumption that the molecule will take shape, so that the electronic repulsion in the valence shell of this atom is minimized. Table Content What is the VSEPR Theory? The reflection theory of the valence of Shell Electron Pair, abbreviated to the VSEPR theory, is based on the premise that there is repulsion between pairs of valent electrons in all atoms, and atoms will always strive to organize in such a way that this aversion of a pair of electrons is minimal. This arrangement of the atom determines the geometry of the resulting molecule. The different geometries that molecules can assume, according to the VSEPR theory can be seen in the illustration below. VSEPR Theory - The different geometries that molecules may assume are the two main founders of the VSEPR theory are Ronald Nyholm and Ronald Gillespie. This theory is also known as the Gillespie-Nyholm theory after these chemists. Read also: According to VSEPR theory, repulsion between two electrons is caused by the principle of Pauli's exclusion, which is more important than electrostatic repulsion in the definition of molecular geometry. THE postulates of the VSEPR theory: The postulates of the VSEPR theory are listed below in polyatomic molecules (i.e. molecules consisting of three or more atoms), one of the constituent atoms is identified as the central atom to which all other atoms belonging to the molecule are bound. The total number of valent shell electronic pairs decides the shape of the molecule. Electronic pairs tend to navigate in a way that minimizes the repulsion of electrons and maximizes the distance between them. The valence shell can be considered as a sphere in which the pairs of electrons are localized on the surface so that the distance between them is maximum. If the central atom of the molecule is surrounded by pairs of communication electrons, we can expect the asymmetrical shape of the molecule. If the central atom is surrounded by both single pairs and pairs of electrons, the molecule will have a distorted shape. The VSEPR theory can be applied to each resonant structure of the molecule. The power of repulsion is strong in two single pairs and weak in two pairs of communication. If the electronic pairs around the central atom are closer together, they will repel each other. This leads to an increase in the energy of the molecules. If the pairs of electrons lie far apart, the repulsion between them will be smaller and eventually, the energy of the molecule will be low. VSEPR Theory Limitations: Some significant limitations of VSEPR theory include: This theory cannot explain species (i.e. elements with the same number of electrons). The species can vary in shapes, despite the same number of electrons. THE VSEPR theory does not shed light on the compounds of transient metals. The structure of several such compounds cannot be properly described by this theory. This is due to the fact that the VSEPR theory does not take into account the associated size of groups and inactive pairs of singles. Another limitation of the VSEPR theory is that it predicts that the halida elements of group 2 will have a linear structure, while their actual structure is curved. Predicting the shape of molecules: The next steps must be followed in order to solve the shape of the molecule. The least electronegual atom should be chosen as a central atom (since this atom has the highest ability to share its electrons with other atoms belonging to the molecule). It is necessary to take into account the total number of electrons belonging to the outer shell of the central atom. It is necessary to take into account the total number of electrons belonging to other atoms and used in the connections with the central atom. These two values must be added in order to get the electronic vapor number of the valence shell or the VSEP number. What is the VSEP number? The VSEP number describes the shape of the molecule as described in the table below. VSEP Number Form Molecule 2 Linear 3 Trigonal Planar 4 Tetrahedral 5 Trigonal Bipiramidale 6 Octahedral 7 Pentagon Bipiramidale Each of these respective forms can also be found in the illustration provided earlier. However, the VSEPR theory cannot be used to produce precise angles of communication between atoms in a molecule. Now we will discuss in detail each shape: Linear shape of a molecule: In this type of molecule we find two places in the valence shell of the central atom. They should be positioned in such a way that repulsion can be minimized (pointing in the opposite direction). Example: Trigonal planar form of BeF2 molecule: In this type of molecule, we find three molecules attached to the central atom. They are arranged in such a way that repulsion between electrons can be minimized (at the corners of an equilateral triangle). Example: BF3 Tetrahedral Shape of Molecule: In two-dimensional molecules, atoms lie in the same plane, and if we spend these conditions on methane, we get a square planar geometry in which the angle of communication between H-C-H is 900. Now, if we look at all these conditions for a three-dimensional molecule, we get a tetraedral molecule in which the angle of communication between H-C-H 109028' (to the corners of the equilateral triangle) CH4 Trigonal Bipyramid Shape of Molecule: Let's take the example of PF5. Here, repulsion can be minimized by the even distribution of electrons to the corner of the trigonal pyramid. In the trigonal bipiramide, three positions lie the equator of the molecule. These two positions lie along the axis perpendicular to the equatorial plane. How can VSEPR theory be used to predict the shape of molecules? The force of repulsion between a lone pair and a connecting pair of electrons lies between the repulsion between two single pairs and between two pairs of communication. The push-off between electronic couples is as follows: Lonely couple-lonely couple - Lonely couple-couple bonds - a pair of bonds. 1. The total number of pairs of electrons around the central atom No. 1/2 (the number of valence electrons of the central atom - the number of atoms associated with the central atom alone bonds) For negative ions add the number of electrons equal to the units of negative charge on the ions, to the valence electrons of the central atom. For positive ions, subtract the number of electrons equal to the units of positive charge on the ion, from the valent electrons of the central atom. 2. The number of Bond pairs and the total number of atoms associated with the central atom by bonds alone. 3. Number of single pairs - Total number of electrons - No common pair of electron pairs around the central atom repel each other and move so far apart that there are no great repulsion between them. This leads to the fact that the molecule has minimal energy and maximum stability. The shape of a molecule with two atoms is always linear. For molecules with three or more atoms, one of the atoms is called the central atom, while the other atoms are attached to the central atom. If the central atom is associated with similar atoms and is surrounded only by pairs of electrons, the repulsions between them are similar, resulting in the shape of the molecule symmetrical, and the molecule is said to have regular geometry. If the central atom is connected to different atoms or surrounded by a pair of bonds, as well as a single pair of electrons, the repulsion between them is similar. As a result, the shape of the molecule has incorrect or distorted geometry. The exact shape of the molecule depends on the total number of electronic pairs present around the central atom. Frequently asked questions on VSEPR theory What is the premise of the VSEPR theory? The repulsion that exists between the electronic vapors in the valence shell causes the atoms to settle in such a way as to minimize this repulsion. This directly affects the geometry of the molecule formed by the atom. What would be the shape of the molecule if the number VSEP is 5? The molecule will have trigonal bipiramide structures. What are the advantages of vsEPR theory? This theory can be used to accurately predict the shapes of molecules of many compounds. Once the geometry of the molecule is understood, it becomes easier to understand its reactions. The first simple theory that has been put forward to explain the shape of a molecule known as Valence Shell Electron Repuls Pairion Theory. the theory was given to Sijvik and Powell in 1940. 1) The central atom is associated with other atoms of covalent bonds, which are formed by the exchange of electrons. 2) The central atom is surrounded by a common pair of electrons and there may be some lone pairs of electrons also present. 3) If the electronic pairs surrounding the central atom are closer, they will repel each other, thereby increasing the energy of the molecules. 4) If the pairs of electrons are far apart, the repulsion between them will be less, and therefore the energy of the molecule will be low. The electronic pairs surrounding the central atom push each other away and move so far apart that there is no repulsion between them any more. As a result, the molecule has minimal energy and maximum stability. 1) The shape of a molecule containing only two atoms is always linear. 2) For molecules containing three or more atoms, one of the atoms is called the central atom with which other atoms are associated. 3) If the central atom is associated with similar atoms and is surrounded only by pairs of electrons, the repulsions between them are similar, resulting in the shape of the molecule symmetrical, and the molecule is said to have regular geometry. 4) If the central atom is connected to different atoms or surrounded by a pair of bonds, as well as a single pair of electrons, the repulsion between them is similar. As a result, the shape of the molecule has incorrect or distorted geometry. The order of repulsion between electronic pairs, how to follow: Lonely pair-lonely pair - Lonely pair-bond-pair Bond-bond pair 5) The exact shape of the molecule depends on the total number of electronic pairs present around the central atom. Calculating the total number of electronic pairs, pairs of bonds and a single pair and predicting the shape of molecules and ions 1) Total number of pairs of electrons around the central atom No. 1/2 (the number of valent electrons of the central atom - the number of atoms associated with the central atom with one connections) a)For negative ions, add the number of electrons equal to the units of negative charge on the ions, to the valentic electrons of the central atom. b) For positive ions, subtract the number of electrons equal to the units of positive charge on the ion, from the valent electrons of the central atom. 2) The number of Bond pairs Total number of atoms associated with the central atom of bonds alone. 3) Number of single pairs Total number of electrons- No common pair question based on vsEPR theory, predict the shape of BrF5 ? The answer is no. valence electrons of the central atom Br No. 7. there are no atoms associated with it with bonds 5 Total. electronic pairs around Br' 6 No. Bonds of couples - No. atoms associated with Br No. 5 No. So the molecule has a type of AB5L hence it has a square pyramidal shape. Form. vsepr theory class 11 pdf. vsepr theory class 11 ncert. vsepr theory class 11 ppt. vsepr theory class 11 by physics wallah. vsepr theory class 11 in hindi. vsepr theory class 11 vedantu. vsepr theory class 11 khan academy. questions based on vsepr theory class 11