

1. Which attractions are stronger, intermolecular or intramolecular? Explain

Solution.

Let's define the intra- and intermolecular attractions.

Intramolecular attraction is the forces that are present inside the molecule and bind together the atoms of the molecule. Intermolecular attractions are the forces that bind individual molecules together.

At the same time, to intramolecular attractions include covalent bonds, ionic bonds, donor-acceptor bonds, and intermolecular bonds include dipole-dipole interactions, van der Waals interactions, and intermolecular hydrogen bonds.

Covalent bonds are formed by combining the electrons of atoms, which saturate their shells to a stable complete level - doublet or octet; ionic bonds are electrostatic forces, when two charges cancel each other to a neutral state; donor-acceptor bonds are the bonds that are formed by the unshared pairs of one atom and the vacant orbital of the other, so in this case saturation of atoms in the molecule occurs.

At the same time, the dipole-dipole interaction is the interaction of the induced dipole moments, when the negative part of one molecule is attracted to the positive part of the other molecule, but the molecules are integral and do not unite their electrons with each other; The van der Waals interaction is the interaction at a level where the electrons of different molecular atoms coordinate their motion along the orbitals without merging; intermolecular hydrogen bonds are the bonds formed by the hydrogen of one molecule and the more electronegative atom of the other, without forming an electronic pair and a completed doublet and octet.

Thus, taking into account all of the above, it is obvious that when a completed doublet or an octet of electrons is being formed, stable energy-favorable states are formed which are difficult to break. Then they say that the molecular attraction is stronger than the intermolecular attraction.

At the same time, intramolecular bonds include an intramolecular hydrogen bond, when the more electronegative atom and hydrogen belong to the same molecule. It, this connection, will be equal in strength to the intermolecular bond. But if we talk about large molecules, such as proteins and polymers, they can be twisted into so-called globules (the case of conformational shear). The latter can also be attributed to intramolecular attraction. In this case, the intramolecular attraction will be weaker than the intermolecular attraction, since in this case the folding into the globule is a process of weak interaction of the already formed electron bonds in the case of accidental guidance of the electric fields of bound electrons.

Answer: intramolecular attractions are stronger than intermolecular attractions if it is not about intramolecular conformational changes.

2. Which attraction is stronger: a covalent bond or a dipole-dipole attraction?

Solution.

The dipole-dipole interaction is the interaction between the negatively charged center of one molecule and the positively charged center of the other by a weak electrostatic attraction. It is

weak because one dipole induces another dipole accidentally in the absence of an external electric field.

The covalent bond is formed by combining electrons into divided pairs to a stable octet or doublet, that is, the electron pair equally belongs to each of the combined atoms in the molecule.

In this connection, the covalent bond is stronger than the dipole-dipole interaction.

Answer: the covalent bond is stronger than the dipole-dipole interaction.

3. What evidence is there those non polar molecules attract each other?

Answer: gaseous compounds, for example such as fluorine, chlorine, bromine, whose molecules are non-polar, can be converted to liquids and solids. If there were no interaction between the molecules of these substances, then the transformation of vich into a liquid or solid would be impossible.

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