Question#45671 - Chemistry - Inorganic Chemistry

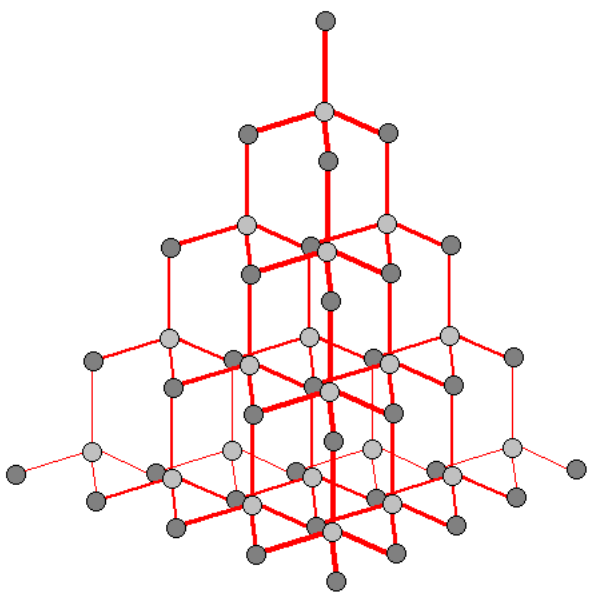
Question:

Why diamond is non conductor but graphite is electrical conductor? Explain

Answer:

Both diamond and graphite are allotropic modifications of carbon. They include only carbon atoms. The difference between carbon and graphite is due to the different molecular structures.

Diamond consists of tetrahedral cwrbon fragments, bounded and resulted in a wide and strong 3D net structure, briefly sckeched below:



Every atom in a diamond is bonded to its neighbours by four strong covalent bonds leaving **no free electrons and no ions.** That's why diamond does not conduct electricity. The bonding also explains the hardness of diamond and its high melting point. A lot of energy would be needed to separate atoms so strongly bonded together.

In graphite, on the contrary carbon atoms are arranged in hexagonal patterns. Paralel patterns form different layers, that are not bounded togetger chemically. The structure of graphite is described with the following scheme:

Each carbon atom is bonded into its layer with three strong covalent bonds. This leaves each atom with a **spare electron, which together form a delocalised 'sea' of electrons loosely bonding the layers together**. These delocalised electrons can all move along together – making graphite a good electrical conductor.