Answer on Question #57546 – Chemistry – Physical Chemistry

Question:

What type of interaction exists between the particles of an ionic and covalent solids.Which solid has higher melting point?.Why?.Give example of each.

Solution:

Depending on the types of particles to lattice sites, and the nature of the relationship between four types of crystal lattices: ionic, atomic, molecular and metallic.

This **ion** is called crystal lattice, whose nodes are ions. They are formed of substances with ionic bonds, which can be simple ions, Na+, Cl- and complex-: SO_4^{2-}, OH^-. Thus, ionic crystal lattice are salts, some oxides and hydroxyls of metals, i.e., those substances that have ionic chemical bond. Consider a crystal of sodium chloride consists of alternating positive sodium ions and negative Cl-, together they form a lattice in the form of a cube. Connection between ions in the crystal are very stable. Because of this substance with the ionic lattice have relatively high strength and hardness, they are refractory and seletusi.

The **atomic** lattice is the crystal lattice, whose nodes are the individual atoms. In such lattices the atoms are connected by a very strong covalent bonds. For example, diamond is one of the allotropic modifications of carbon.

Substances with an atomic crystal lattice is not highly distributed in nature. These include crystalline boron, silicon and germanium, and compounds, for example, which is composed of silicon oxide (IV) – SiO2: silica, quartz, sand, rock crystal.

The vast majority of substances with an atomic crystal lattice have a very high melting point (diamond it exceeds 3500° C), such substances are durable and solid which is nearly insoluble.

Call such a **molecular** crystal lattice, whose nodes are molecules. The chemical bonds in these molecules can also be as polar (HCl, H20) and non-polar

(N_2, O_3). And although the atoms are connected within molecul very strong covalent bonds, between molecules acts weak intermolecular forces of attraction. This is why substances with the molecular lattice are characterized by low hardness, low melting point, volatility.

Examples of such substances can serve as a solid water – ice, solid carbon oxide (IV) – "dry ice", solid hydrogen chloride and hydrogen sulfide, solid simple substances formed by 1- (the noble gases), 2- (H_2, O_2, Cl_2, N_2, I_2), 3- (O_3), 3- (P_4), 8- (S_8) atomic molecules. The vast majority of solid organic compounds have a molecular lattice (naphthalene, glucose, sugar).

For metals is characteristic the **metal crystal lattice**. It has a metallic bond between atoms. In metallic crystals, the nuclei of atoms are arranged in such a way that their packaging was more dense. Communication in such crystals is delocalized and extends over the whole crystal. Metallic crystals have high electrical conductivity and thermal conductivity, metallic luster and opacity, easy deformability.