

Chemistry psychology flashcard



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A metal consists of a lattice of positive ions surrounded by a 'sea' of mobile delocalised valence electrons. ; Metallic bonding is the electrostatic attraction between the delocalised electrons and the positive ions in the metallic lattice.

Properties of metals: Property Explanation Relatively high density The particles are very close together. This is because of high electrostatic forces between the sea of valence electrons and the positively charged nucleus.

Malleability and Ductility Because metallic bonding is non-directional meaning that the bonds don't have to exist with a set pair of particles, means that the positive nuclei can easily slip over each other with bonds being broken. Conductivity of electricity Conductivity of electricity requires two things, charged particles and they have to be freely moving.

Metals have free-moving electrons, therefore they can carry a charge. Also because these electron Conductivity of Heat in metals, not only do the atoms vibrate more when heated, but the free electrons charge around more as well.

These transfer the energy much faster than just vibrations in bonds. Heat spreads by conduction when atoms increase their vibrations, and pass this energy on to those nearby. In metals, free electrons carry the heat energy faster than the atomic vibrations and transfer it by colliding with other electrons and atoms.

High melting and boiling points Very strong electrostatic bonds between the electrons and nuclei make it very hard for heat to overcome the bonds which make the metal solid or liquid.

Ionic Compounds: Ionic substances consist of positive ions and negative ions arranged in a regular lattice ; Ionic bonding is the electrostatic attraction between oppositely charged ions High melting and boiling points Strong electrostatic forces between the positive and negative ion make it hard for heat to overcome the strong bonds which are required to break for the substance to become solid or gas Brittleness When a layer of ions slide over another layer of ions, the same-charged ions will be over each other and repel, effectively breaking the bonds between them.

Non-conductor of electricity in solid and aqueous state. In the molten state, the bonds between the anion and cationic are broken and they will be free-flowing. This means that they can carry a charge because they are free flowing and also are charged particles, two things essential for a flow of current.

In a solution they are separate ions (as explained below) Solubility The positive ion will break away because it is attracted to the negative end of the water molecule (O-end) and the negative ion will break off because it is attracted to the positive end (H-end).

Then they will spread apart because they will be free flowing with the water molecules. Covalent Molecular: Within molecules, atoms are held together by the electrostatic attraction between shared electrons and the nuclei of all the atoms. This is called covalent bonding. In covalent molecular substances, the atoms in the molecules are held together by covalent bonds (which are strong bonds). But between the actual molecules there are weak attractive forces called intermolecular or Van Der Waals's forces.

There are three called dispersion, dipole-dipole and hydrogen bonding. ;

Dispersion: temporary dipoles can exist because electrons are in random movement and can all be at the same side of a molecule, creating a temporary uneven charge distribution, this can be enough for another molecules' electrons to get attracted to the positive side of the molecule and vice versa, creating a weak electrostatic bond. Dipole-Dipole: This occurs when covalent compounds contain elements with big variances in electronegative and one “ hogs” most of the electrons, creating an uneven charge distribution, this creates electrostatic bond between opposite charged sides of molecules. ; Hydrogen bonding: an extreme case of dipole-dipole, this happens between O-H, H-N, and F-H groups. It is seen as an extreme case of DID because the electronegative of the elements have big variances.

Property Explanation Low melting and boiling points Weak Intermolecular forces Soft and waxy Weak Intermolecular forces

Non-conductors of electricity Don't have free flowing charged particles (except some things like HCl become ions when dissolved in water) Covalent Network These are substances that are not composed of molecules but are made up of crystal lattices. They are like covalent molecular substances in that they have intermolecular tortes but they lack intermolecular tortes, instead on “ piece” to this substance can be regarded as one molecule-that is to say, that all the atoms in it are bonded together through strong intermolecular forces, aligned in a lattice like structure.

The structure also contributes towards the strength of the bonds. Property Explanation High m/b points Strong intermolecular forces and structure Non-conductors The electrons are localized or non-bonding Hard and brittle It is brittle because if one part shatters, the structure gets weaker and is not malleable therefore it shatters.

Graphite: a special case: Graphite is slippery because it made up of layers that are intermolecular bonded, but the actually carbons in the layers are intermolecular. This makes it very slippery, because the layers can easily slip over each other.

In the layers, a carbon atom is surrounded by 3 other carbon atoms. One carbon atom donates 1 valence electron to ACH of its neighbors, the last one becomes ideological, localized in its layer, and this means graphite has electrical conductivity.

Gases, Liquids and Solids Kinetic Theory: Gases consist of tiny particles which move in random straight line motion until they hit another particle or vessel they are contained in. ; Collisions between particles and vessels are perfectly elastic. ; The size of the particles are negligible when compared with distance between the particles, this means the volume of the particles are near nil when compared with the volume of the whole gas.

; Any attractive or repulsive forces are negligible in gases