

PC RAY GROUP

Solid states

Q.1 In India, we have shortage of electricity. Electricity is being produced by Hydel Power, Thermal Power, Gas and Nuclear Power etc. which needs a lot of fuel which is limited in our country. Non-conventional sources like wind, tidal, solar energies is being used to some extent to generate power. Solar energy can be converted into electricity by special type of substances called photovoltaic material.

Use of CFL and LED lamps can also save lot of electricity.

- (i) Name one Photovoltaic Material
- (ii) Why solar power generation better than conventional way of generating power? Give one Reason.
- (iii) Why is Solar Power not very popular in India?
- (iv) What are the values associated with above passage?

Ans: (i) Amorphous Silicon

(ii) Solar Power is pollution free, while conventional sources such as Thermal Power produces pollution.

(iii) Solar Power is expensive as the appliances used are costly.

(iv) We use reduce consumption of electricity as it is generated by very valuable natural resources which are on the verge of depletion.

Q.2 A large variety of Solid State materials have been prepared by combination of gp. 13 and 15 or gp.12 and 16 to stimulate average valence of 4 as in Ge, Si. InSb, AlP, Gas are gp. 13-15 compounds. Gallium Arsenide semiconductors have very fast response and have revolutionized the design of semiconductors. ZnS, CdS, CdSe, HgTe are examples of gp. 12-16 compounds . On adding calculated amount of impurity to Si and Ge increases their conductance.

- (i) Why are the compounds of gp.12-16, 13-15 are better semiconductors than Si and Ge?
- (ii) Are these compounds safe to use for our environment?
- (iii) What is the best solution to the problem?
- (iv) What are the values associated with it?

Ans: (i) They have delocalized electrons and holes in their lattice which contribute in the conduction of electricity.

(ii) No, excess use of these compounds electronic waste.

(iii) Recycling of the waste produced.

(iv) Recycling of the waste material can not only save the resources but also minimizes electronic pollution.

Q.3 The conductance of metal decreases with increase in temp. and increases with decrease in temp. Some metals offer no resistance at low temp. These are best for electrical transmission.

- (i) What is the name given to metals which practically offer no resistance at low temp? In Japan, fastest train makes use of these substances.
- (ii) Are these Diamagnetic or Paramagnetic?
- (iii) How does the use of superconductors for electrical transmission helps in economy of a country?

Ans: (i) Superconductors

(ii) Superconductors are Diamagnetic in nature.

(iii) Electric energy isn't lost as heat due to negligible resistance present.

Q. 4 Graphite has typical hexagonal structure. Carbon atoms are arranged in different layers and it is soft and slippery. It is used in pencils, dry-cells and other cells.

(i) Why is Graphite used as lubricant at high temp. in machine parts?

(ii) Why is Graphite a good conductor of electricity although it is a covalent solid?

(iii) Is use of Graphite threat to environment?

Ans: (i) it is composed of loosely packed layers which slip over one another and also has a very high melting point as it is a network covalent crystal. Hence can be used in machineries which operate in high temperature.

(ii) Graphite Carbons are sp^2 hybridized and its unhybridized p orbital have delocalized electrons (free electrons).

(iii) No.

Q.5 Shudhansu made a model of the unit cell of diamond. It resembled the unit cell of ZnS.If the unit cell of ZnS has 4 units of ZnS per unit cell. It has the same packing efficiency of ZnS.But diamond is the hardest known substance.

a.What is the number of atoms of carbon per unit cell of diamond ?

b.Why ?

c.What is the value that Shudhansu can derived from these facts ?

Ans.

a. The number of atoms of carbon per unit cell is 8 in diamond

b. The C-C bond is very strong in diamond (due to small size of carbon)

c. Though from the same background i.e. with the same structure the property can be different, thus with a little effort,we can do same things differently and brings about major changes.