

HW KEY: p366#4, p 388#2, p657 #3,4,5,6  
Surface Tension, Capillary Action, graphite and diamond

p.366

4) Explain why liquids in a test tube form a meniscus.

Liquids in a test tube will be attracted to the glass test tube, so the liquid travels up the sides of the tube slightly. This is called capillary action.



travels up

p. 388

2) What is surface tension? It is the force that tends to pull adjacent parts of a liquid's surface together, thereby decreasing surface area to the smallest possible size.

**Stronger attractions = stronger surface tension**

p. 657

3) What properties of diamond determine most of its industrial uses?

Its extreme hardness and high melting point makes it an excellent choice for cutting, drilling and grinding.

4) Why does graphite conduct electricity while diamond does not?

Graphite conducts electricity because it consists of a network of  $sp^2$  hybridized (trigonal planar) carbon atoms, so each carbon has an unhybridized p orbital. The p orbitals overlap in a network of  $\pi$  (pi) bonds. Since, electrons are weakly held in  $\pi$  bonds, the electrons are able to flow and conduct electricity.

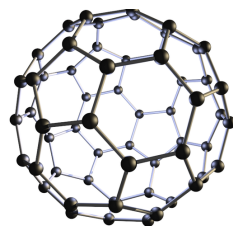
Diamond does not conduct electricity because it consists of a network of  $sp^3$  hybridized (tetrahedral) carbon atoms, so all carbons are connected by only  $\sigma$  (sigma) bonds. Electrons are held tightly in  $\sigma$  bonds, so electrons are not free to flow.

5) Explain why the structure of graphite makes it useful as a lubricant.

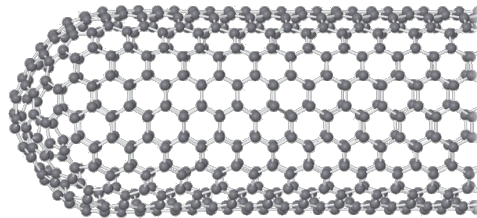
Graphite consists of layers. All carbons within one layer are bonded by strong covalent bonds, but there are only weak dispersion attractions between the layers. Thus, the layers can slide over each other. This makes graphite very slippery and so is a good lubricant.

6) Describe the structure of buckminsterfullerene.

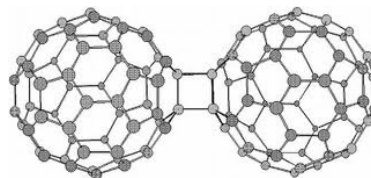
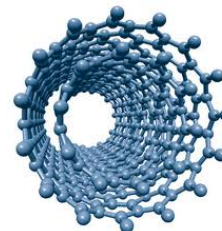
Buckminsterfullerene (or Buckyball) consists of 60 carbons in a cage-like structure that resembles a soccer ball.



buckyball



nanotube



fullerene dimer