

## Electrical Resistance

- Electrical resistance is a measure of how difficult it is for electrons to flow through the material.

Insulators → very high resistance

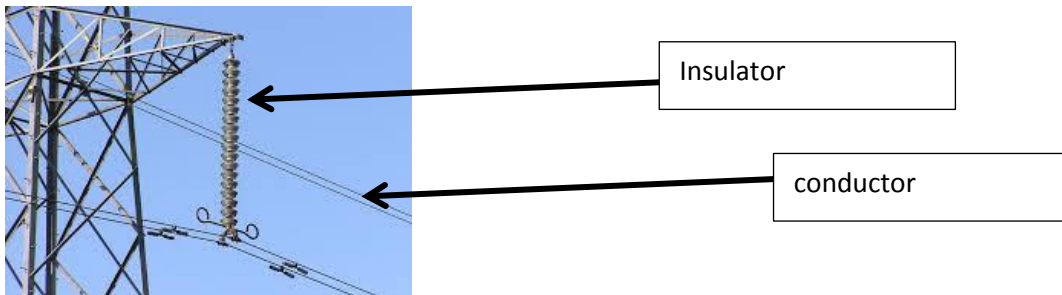
Conductors → relatively low resistance

\*finer gradations of resistance in conductors    ie: silver has less resistance than copper

Low resistance → desired when need lots of power    ie: signal to audio speakers. Loud sound = a lot of electrical power!

High resistance → desired when you don't want fine wires damaged    ie: cell phone circuitry.

- Ceramic resistors - copper wires looped many times slow down the current a measured amount. They are coated in ceramic because they get hot!



Superconductors = conductor with NO resistance (no wasted energy!)

- 1<sup>st</sup> superconductor was liquid helium at  $-269\text{ }^{\circ}\text{C}$     Not feasible!! We can't wire a house in liquid helium AND it takes so much money to cool to  $-269\text{ }^{\circ}\text{C}$  that any gains we make having a superconductor we lose getting the situation that cold!
- Hg-1223 (a material) at  $-135\text{ }^{\circ}\text{C}$  acted as a superconductor. - not much better
- Large particle accelerators do supercool their conductors to conserve energy
- Goal? Room temperature superconductor

