

Traditional: 08-06

Themed: 05-07

Faraday cage, Van de Graaff & Leyden
Jar

Faraday Cage

- Faraday cage: A hollow conductor
- Any electrons inside? Naturally make electric field which pushes them outside
 - Consequence: no electrons remain inside
 - Zero electric field inside

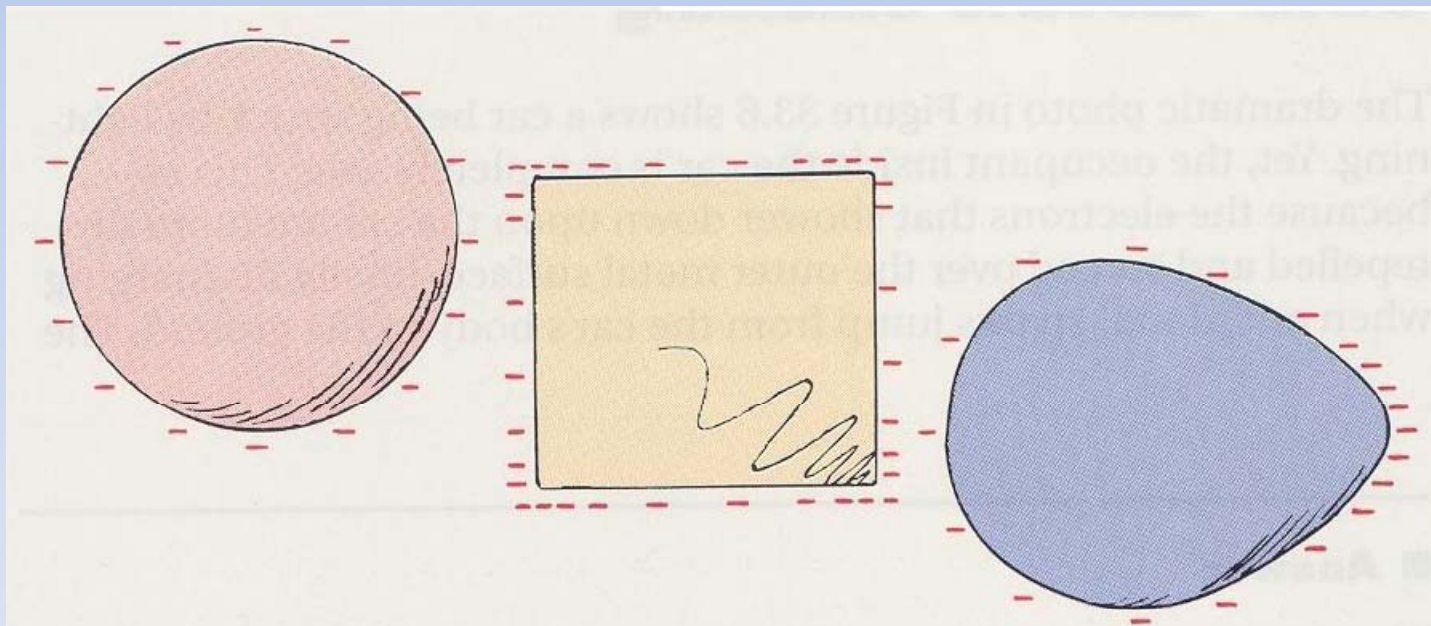


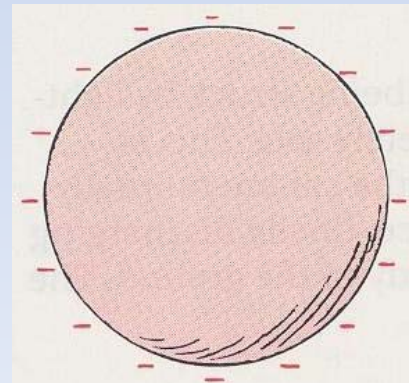
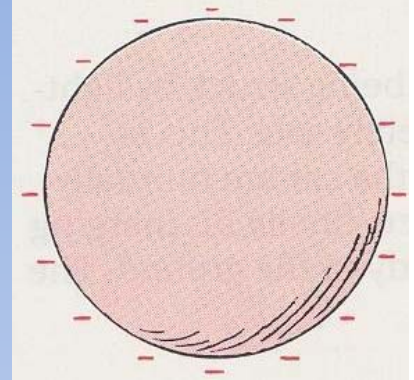
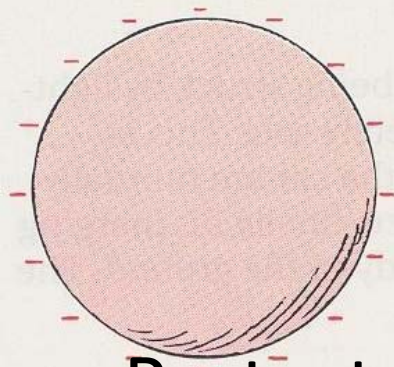
Figure 33.8 ▲

Static charges are distributed on the surface of all conductors in such a way that the electric field inside the conductors is zero.

Faraday Cage

Cool properties

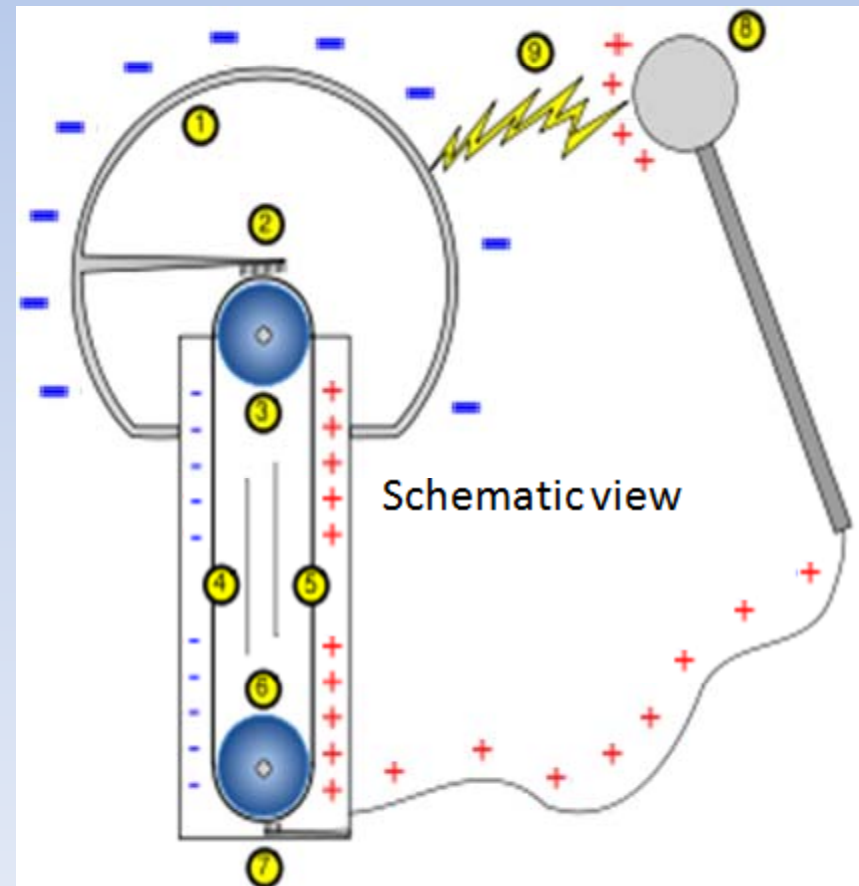
- Protects from lightning strikes!
 - Electrons dumped on outside, stay outside
 - Cars & planes are Faraday cages
- Electric field of zero means EM radiation doesn't penetrate well (cell phones, radios, anti-spying)
 - Rule: if EM wave size much smaller than holes in cage, EM penetrates
- Charges dumped inside move outside (charges can mean elec. or lack of elec.)



Van de Graaf Generator

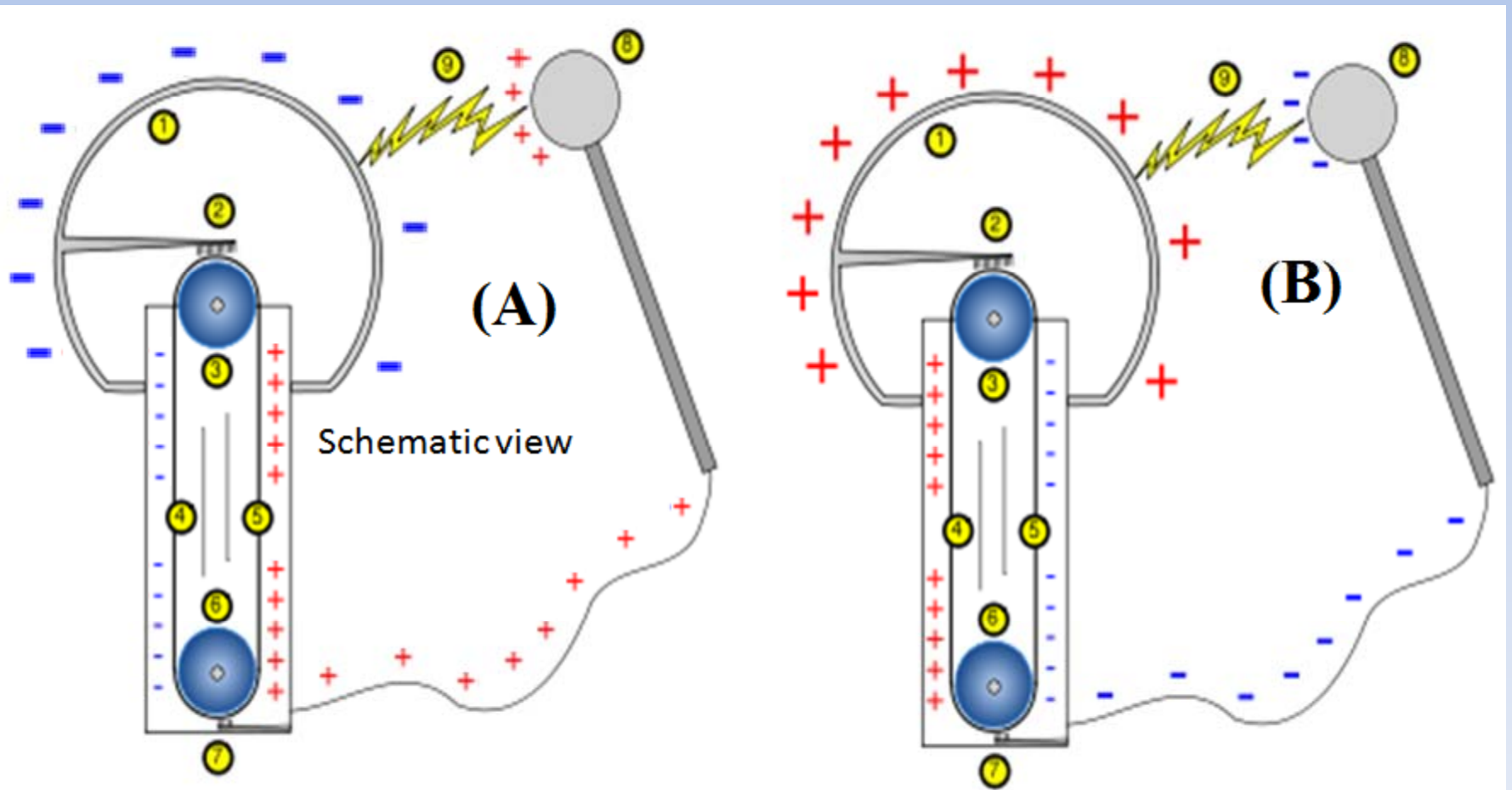
- Friction between roller 6 and belt dump charge (-) on belt
- Zero electric field in Faraday cage and pointy comb teeth (2) lets charge jump to inside of dome (FC) with “push” from top roller (3, charge to repel charge on belt)
- Charges spread out on outside of dome (FC), so electric field stays zero
- Grounded pointy comb teeth (7) allow flow of charge to/from ground

Rabbit Fur	Copper
Acetate	Silver
Glass	UV Resist
Mica	Brass, SS
Human Hair	Gold, Platinum
Nylon	Sulfur
Wool	Acetate Rayon
Fur	Celluloid
Lead	Orlon
Silk	Acrylic
Aluminum	SRAN
Paper	Polyurethane
Cotton	Polyethylene
Steel	Polypropylene
Wood Neutral	Rubber Balloon
Amber	PVC (Vinyl)
Sealing Wax	Silicon
Hard Rubber	Teflon
MYLAR	
Nickel	



What kind of Van de Graaff do we have?

- You could just as easily dump “positive charge” as negative charge...which kind we have?



Leyden Jar

- First “capacitor”
- Capacitor stores charge, which it can dump all at once (camera flash)
- Consists sandwich of conductor, insulator, conductor
- Inside conductor gets charges and pushes electrons on outside conductor into ground (outside must be grounded)
- Touching outside & inside at same time =Zapppppp!

