

10.3 Charges at Work

SNC1D

Lightning

Lightning occurs when static charge builds up in clouds, and then rapidly discharges



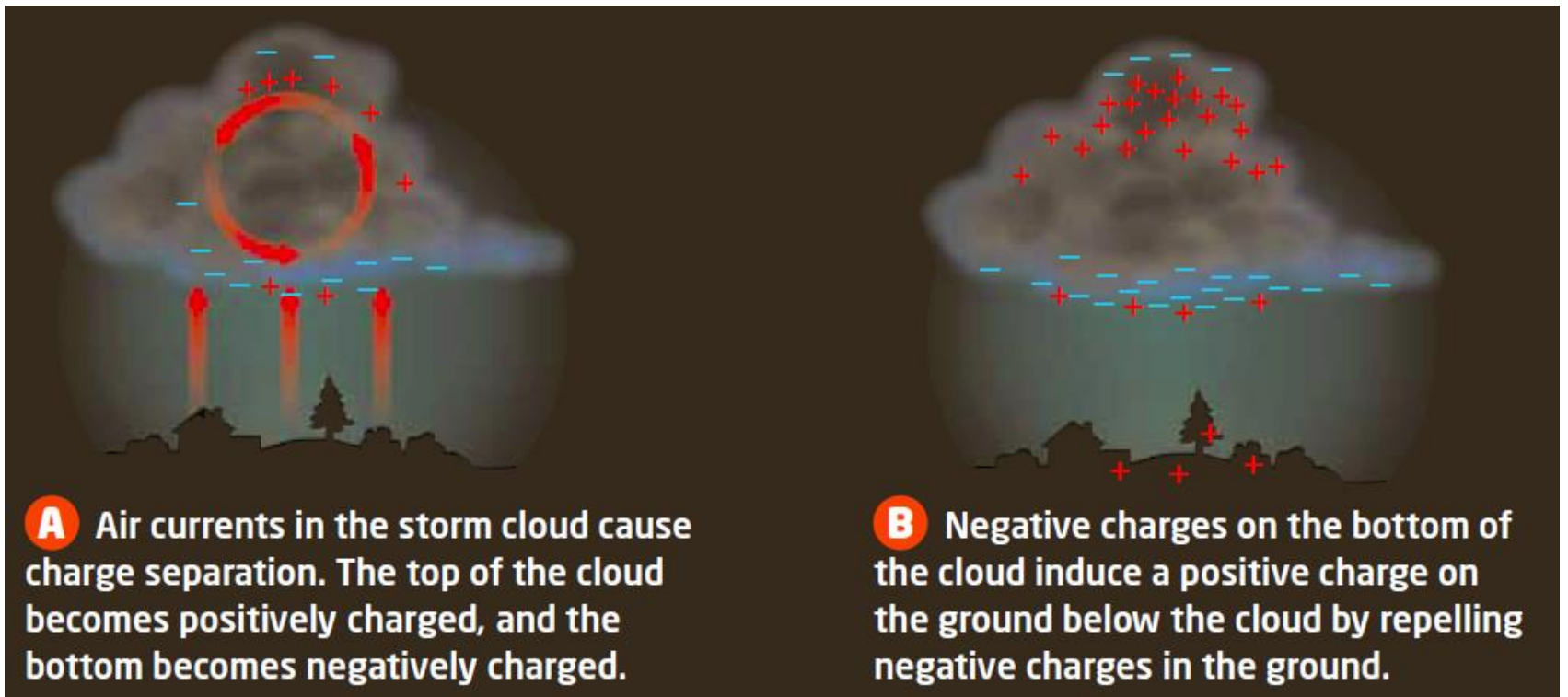
Lightning

a) *Producing the charge:*

Wind currents cause water and ice pellets to rush past each other. They become charged by _____*.

Negative charges accumulate at the bottom of the cloud, and induce a _____** charge on the ground below.

Lightning



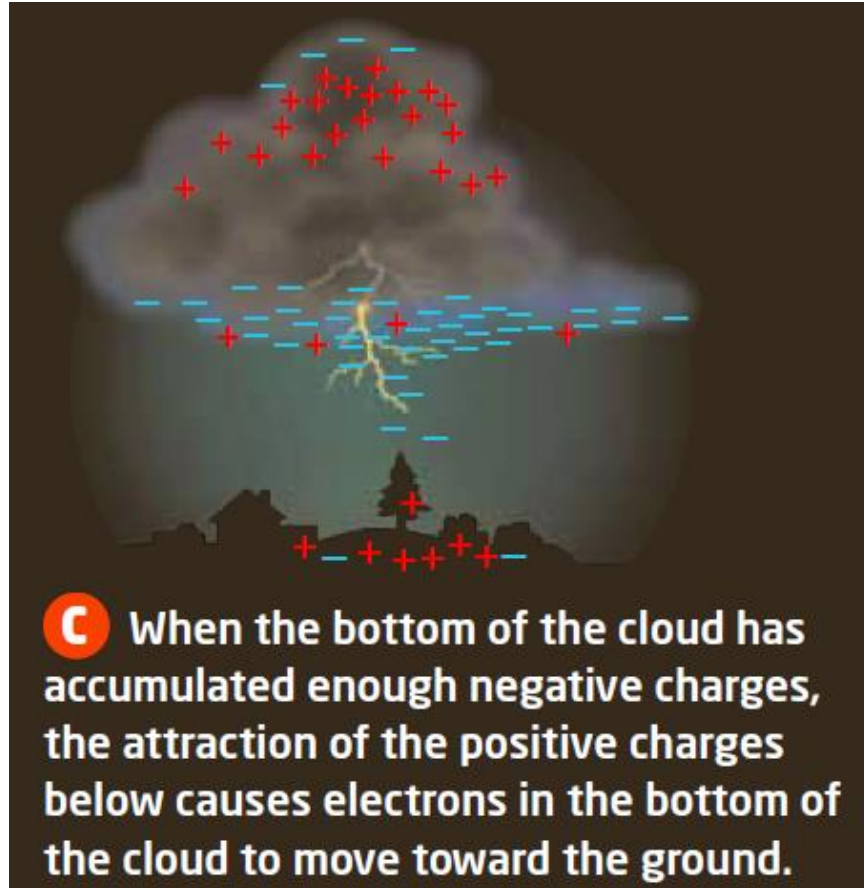
Lightning

b) Electric discharge:

When enough negative charges build up in the cloud, a giant electric _____* occurs. The electrons at the bottom of the cloud move toward the ground.

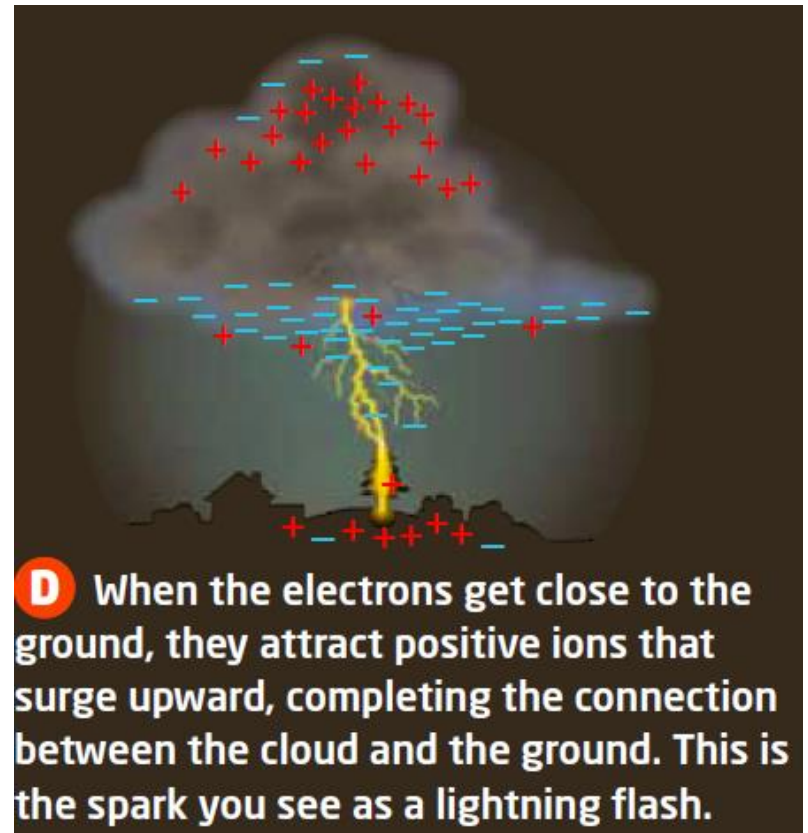
This stream of electrons is called a _____.

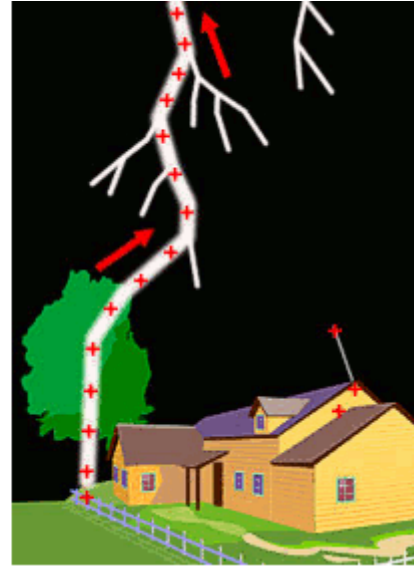
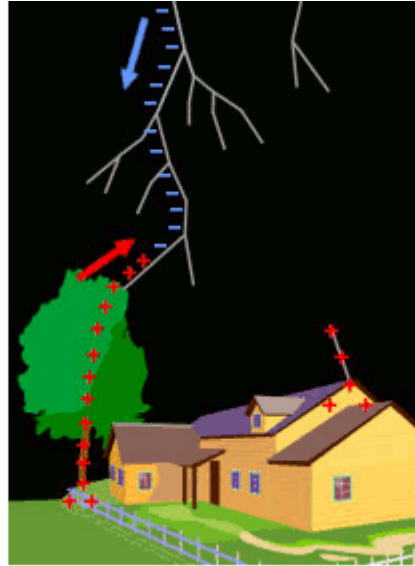
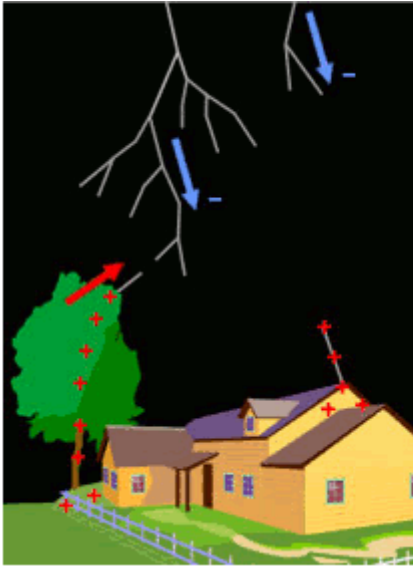
Lightning



Lightning

c) A stream of positive ions jumps from the ground, to meet the stepped leader in the air. This positive stream is called the _____.





<http://people.ee.duke.edu/~cummer/Lightning.html>

Mysterious phenomenon: Upward Lightning!



<http://youtu.be/RDDfkKEa2ls>

Lightning

The sound of thunder is produced due to the rapid expansion of air that occurs when it becomes heated by lightning.

b. Why is lightning usually seen **before** thunder is heard?

Light travels faster than sound.

Speed of light = 3.00×10^8 m/s

Speed of sound = 343.2 m/s

Lightning Rods

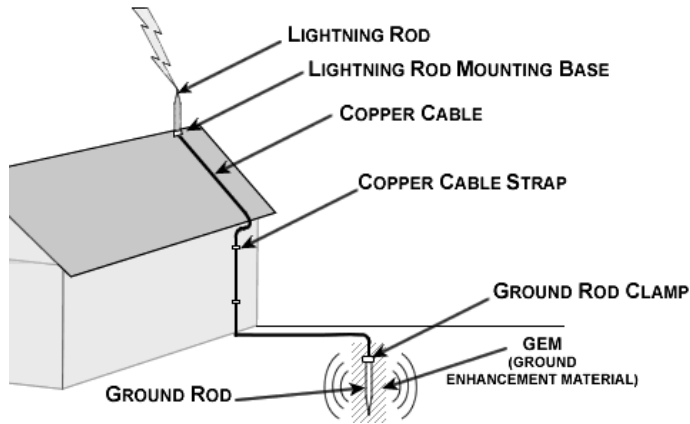
Lightning will take the path of least resistance. Therefore, it tends to strike the tallest object in an area.

Potential hazards:

- can harm living things
- forest fires
- building fires
- damage electrical devices



Lightning Rods



A metal sphere or point that is attached to the highest part of a building, and connected to the ground.



Van de Graaff Generator

Van de Graaff Generator - A device that can accumulate very large amounts of charges.



<http://youtu.be/sy05B32XTYY>

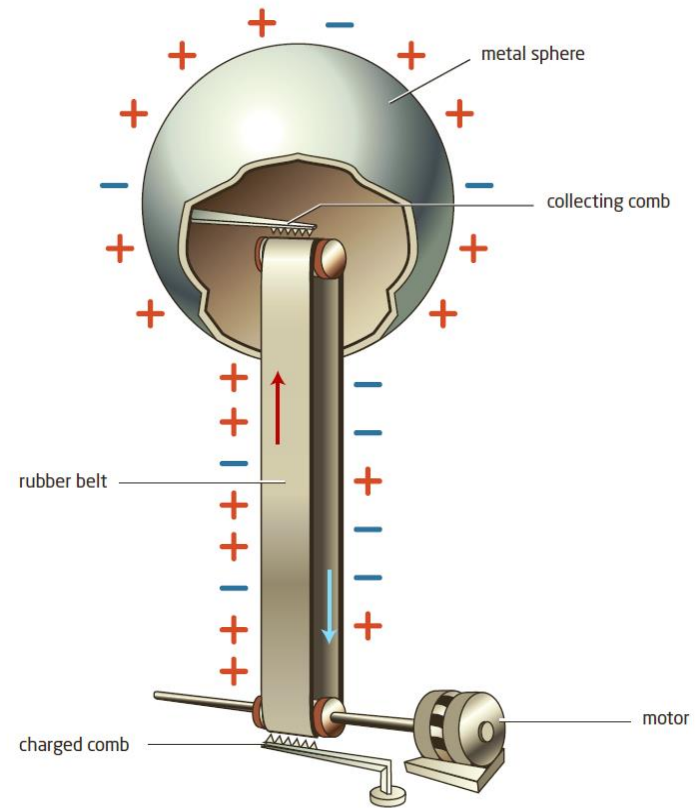
Van de Graaff Generator

HOW DOES A VAN DE GRAAFF GENERATOR WORK?

the belt becomes charged by

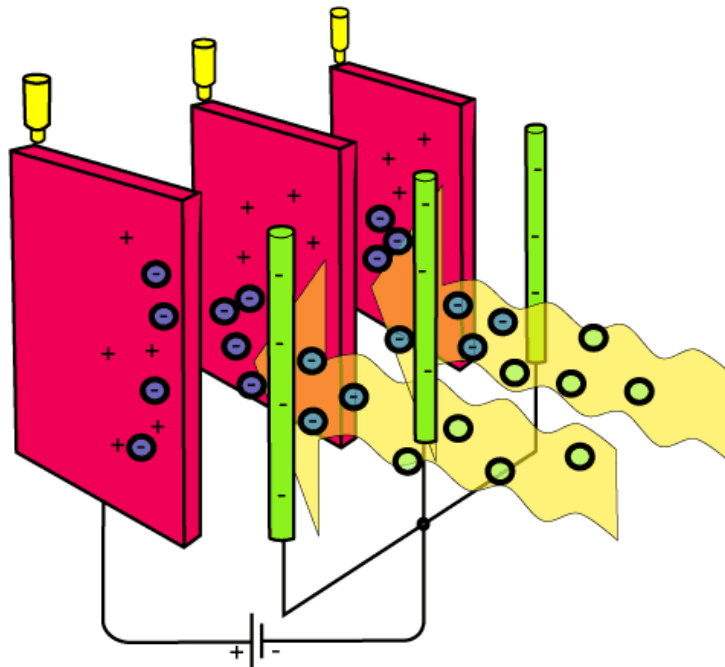
belt carries the charges up to a metal sphere

charge accumulate on sphere



Electrostatic Precipitator

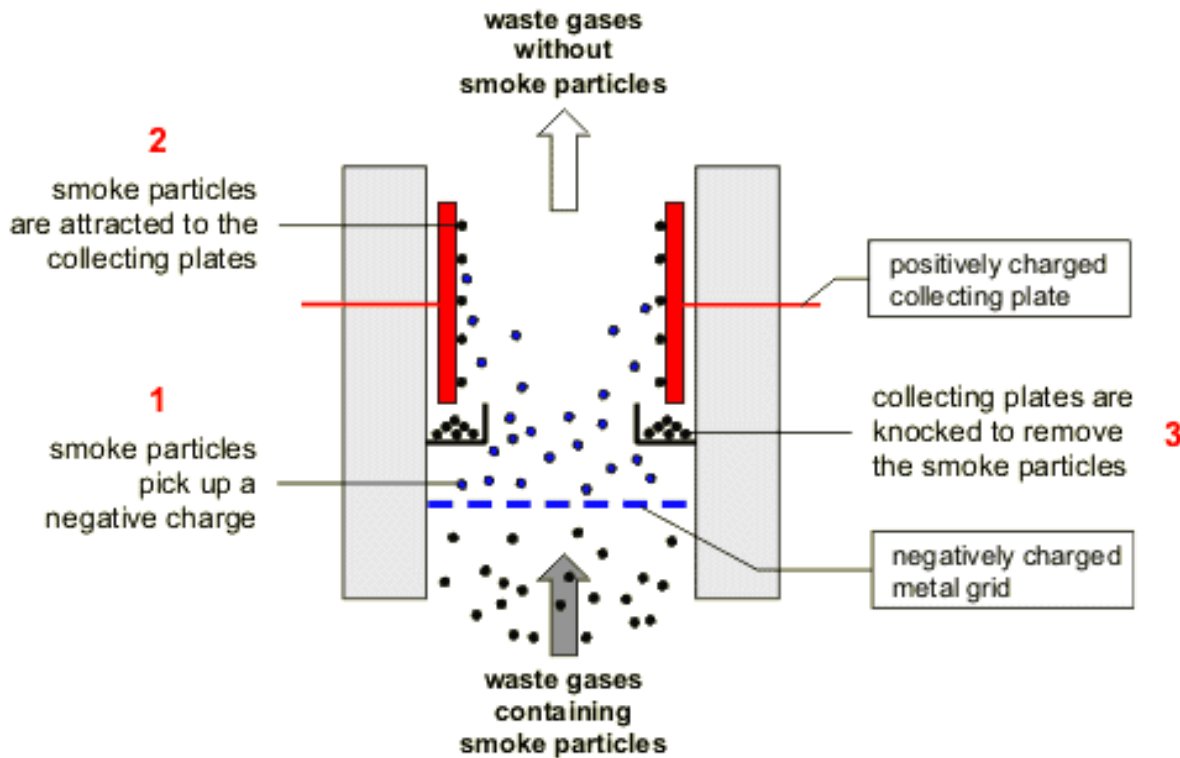
...used to reduce industrial air pollution.



<http://youtu.be/x5YFK8mmeRQ>

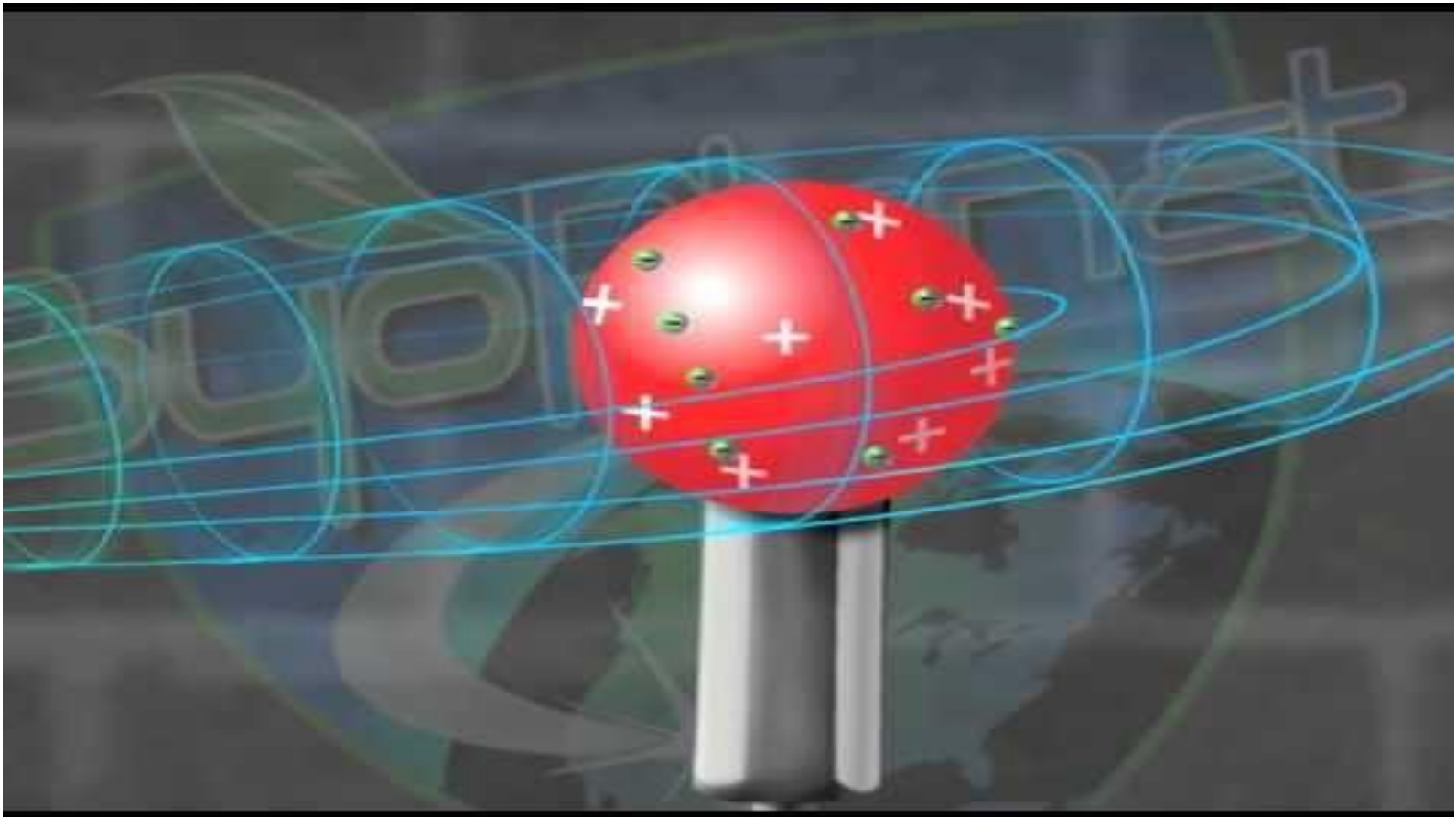
As smoke rises upwards, it picks up a negative charge from the grid

Negatively-charged smoke particles move upwards, and are attracted to collecting plates. These plates have a _____ charge.



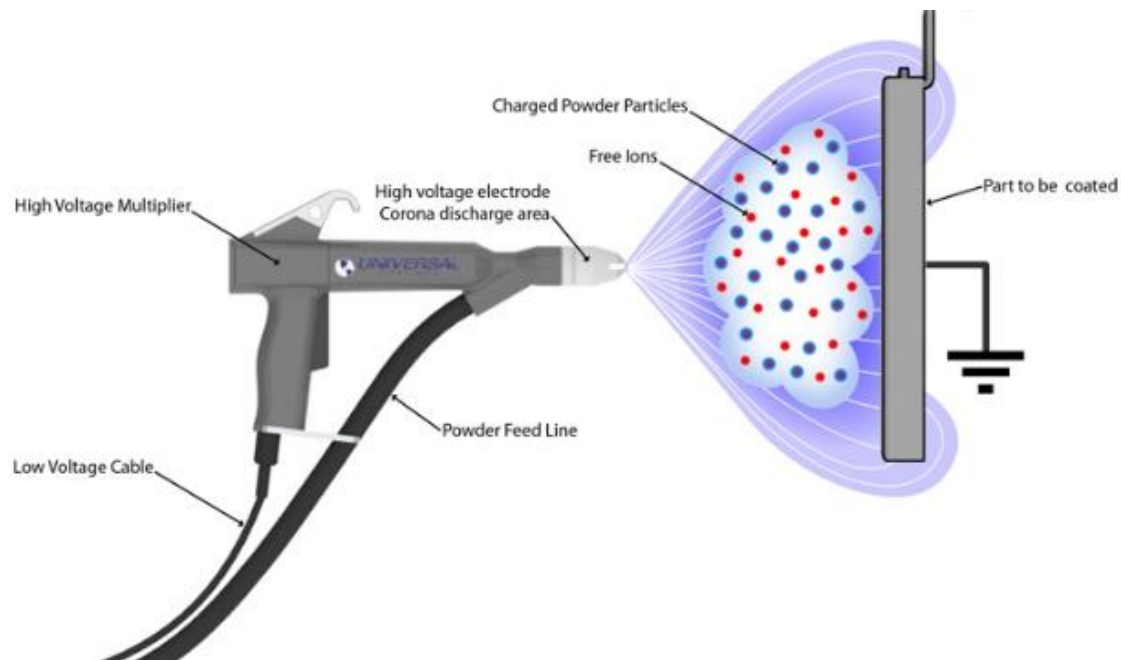
What method is used to charge the smoke particles?

Electrostatic Spray Painting



Paint particles are given a charge, using an electric paint spraying gun.
The object to be painted is grounded, which keeps it neutral.

neutral + charged = attraction!



Homeworkk

Chapter 10 Review

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