

Van de Graaff generator

More Details

Why is my hair standing on end?

By touching the ball, one's body and accordingly one's hair are positively charged. Since like charges repel each other, each individual hair strand is repelled from every other. The greatest possible distance between each hair is achieved when the hair stands on end. A similar effect is known from combing dry hair or rubbing hair with a balloon.

What happens in the big metal ball?

1. In the tube under the ball, there is a wide rubber band on two rollers, which are driven by a motor in the lower part of the generator (Fig. 1).
2. At the bottom, the rubber band moves past a metal comb that is positively charged by an applied voltage. Due to the positive charge, the comb attracts the negatively charged electrons of the rubber band. These are transferred to the comb.
3. Due to the missing electrons, the rubber band is positively charged.
4. Additionally, electrons are transferred from the rubber band to the rollers through friction, increasing the positive charge of the rubber band. This charge separation is called triboelectric effect.
5. In the hollow metal ball, the rubber band moves past another comb, which is connected to the hollow ball.

6. Due to the positive charge of the rubber band, electrons from the comb, the hollow ball, and also from the person touching the ball are transferred to the band, so that the hollow ball and the person are now positively charged.
7. The rod connected to the Van-de-Graaff generator is used to ground it. This ground rod is neither positively nor negatively charged.

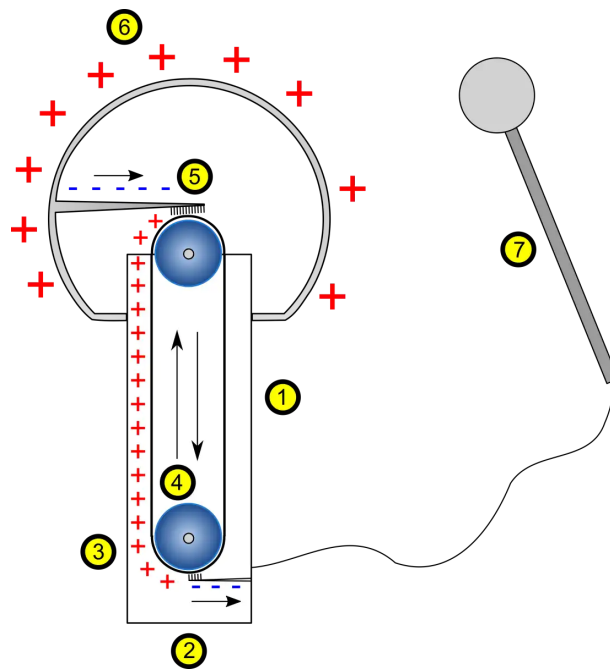


Fig. 1: The metal ball is positively charged by rubbing a rubber band on rollers.

What is the Van de Graaff generator used for?

The American physicist Robert Jemison Van de Graaff developed the first generator in 1929. It was the first design of a particle accelerator.

Van de Graaff generators are often used for demonstration experiments with high voltages, for example in school lessons.

Additionally, the invention of the Van de Graaff generator laid the groundwork for the Van de Graaff accelerator. This is a particle accelerator used for nuclear physics experiments, in which mainly positively charged ions are accelerated through the positively charged hollow ball.