



Why Is The Earth Negatively Charged

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Answer to Solved The earth is negatively charged, carrying 500,000 C.

The earth is negatively charged, carrying 500,000 C of electric charge. This results in a 300 kV potential difference between the earth and the positively charged ionosphere. $C(\text{earth-ionosphere}) = 1.7F$ If we assume that the bottom of the ionosphere is 60km above the surface, what is the magnitude of the average electric field between earth and the ionosphere? $E = ?$

Video advice: [Why Is An Electron Negative In Charge](#)

#physics #science #electrons #ElectricCharge

Conductors and Insulators

By the end of this section, you will be able to:



5 shows how the polarization of atoms and molecules in neutral objects results in their attraction to a charged object.

- Learning Objectives
- Check Your Understanding
- Solution
- Conceptual Questions
- Problems & Exercises
- Selected Solutions to Problems & Exercises

Section Summary

Some substances, such as metals and salty water, allow charges to move through them with relative ease. Some of the electrons in metals and similar conductors are not bound to individual atoms or sites in the material. These free electrons can move through the material much as air moves through loose sand. Any substance that has free electrons and allows charge to move relatively freely through it is called a conductor. The moving electrons may collide with fixed atoms and molecules, losing some energy, but they can move in a conductor. Superconductors allow the movement of charge without any loss of energy. Salty water and other similar conducting materials contain free ions that can move through them. An ion is an atom or molecule having a positive or negative (nonzero) total charge. In other words, the total number of electrons is not equal to the total number of protons.

Understanding Lightning: Thunderstorm Electrification

While the exact details of the charging process are still being studied, scientists generally agree on some of the basic concepts of thunderstorm electrification. The main charging area in a thunderstorm occurs in the central part of the storm where air is moving upward rapidly (updraft) and temperatures range from -15 to -25 Celsius (Figure 1).

At that place, the combination of temperature and rapid upward air movement produces a mixture of super-cooled cloud droplets (small water droplets below freezing), small ice crystals, and soft hail (graupel). The updraft carries the super-cooled cloud droplets and very small ice crystals upward. At the same time, the graupel, which is considerably larger and denser, tends to fall or be suspended in the rising air. The differences in the movement of the precipitation cause collisions to occur. When the rising ice crystals collide with graupel, the ice crystals become positively charged and the graupel becomes negatively charged (Figure 2).

Video advice: The Difference Between Positive and Negative Cloud to Ground Lightning



On the Negatively Charged Layer of the Earth's Electric Field

NASA/ADS – Based on the hydridic Earth model, we propose a hydridic model of the Earth's electric field. The model predicts that the negative electrode of the Earth's capacitor is located under the Earth's crust and the Earth's fluids carry a positive charge. We have observed an excess of positive charge in the Earth's crust down to kilometer depths. The model explains the unitary variation of the fair-weather atmospheric electric field strength, the change in atmospheric electric field strength and the precipitation of high-energy electrons during earthquakes.

Why Does Electricity Go to the Ground?

The Lightning Rod – Even though lightning has been understood by science for quite some time, it's hard not to feel a bit of primal fear when watching those bright bolts split the sky. Lightning, of course, is actually a quick burst of electricity. Electricity (whether it comes from lightning or any other source) heads to the ground as a result of some very basic forces. Basically, clouds filled with tons of negatively charged particles are attracted to the positively charged ground. Once the buildup is large enough, those electrons collect and zip through the sky to a conductor on the ground. What is Electricity? All matter is made up of atoms. These atoms consist of subatomic particles, including positively charged protons and neutral neutrons. Negatively charged electrons orbit those particles. When those electrons are pulled away from the nucleus of protons and electrons, they flow until they find balance, joining up with other positively charged materials. Why the Ground? The ground is an attractive place for electricity to flow because it is positively charged, only more so when the tiny particles in the atmosphere collide, filling clouds with negatively charged particles.

The Electric Charge on Rain on JSTOR – J. A. McClelland, J.J. Nolan, The Electric Charge on Rain, Proceedings of the Royal Irish Academy. Section A: Mathematical and Physical Sciences, Vol. 29 (1911/1912), pp. 81-91.

The Royal Irish Academy, the academy for the sciences and humanities for the whole of Ireland will vigorously promote excellence in scholarship, recognise achievements in learning, direct research programmes and undertake its own research projects, particularly in areas relating to Ireland and its heritage.

Video advice: What is Ground? Earth Ground/Earthing

What is ground and what does it mean to do Earthing? Here I answer what ground is, how it relates to your wall socket and the wiring in your appliances, how to get grounds for your high voltage and other experiments, and about the ground symbol in electrical schematics.