Static electricity

The first accounts of the effects of static electricity
Static electricity is one of the oldest scientific phenomena ever observed. It can be observed every day, such as when people rub their feet on a carpet and then feel a small shock when they touch something; or when trouser legs keep sticking to a person's leg. The Greek philosopher and mathematician, Thales of Miletus, was the first to describe static electricity in 500 BC: he observed that if he rubbed amber with a piece of animal fur, some dust particles or even light objects like feathers started to stick to it. From then on, many others have observed this "power of attraction" and have tried to explain it.

What gives rise to static electricity?
Static electricity comes from the interaction of atoms and, more specifically, from an imbalance between negative and positive charges in objects. In fact, it is caused by the movement of electrons from one object to another, which can occur when two objects are rubbed together quickly: one object gives up electrons and becomes more positively charged, while the other collects electrons and becomes more negatively charged.

The power of friction
This is what is known as the *triboelectric effect* (*tribo-* comes from the Greek word for "to rub"), and is a kind of contact electrification in which certain materials become electrically charged after they are separated from a different material that they were previously in contact with: the stronger the friction, the larger the charge.

When two objects with a different charge get close to each other, they will attract; objects with similar charges, instead, will repel, which is exactly what occurs with a magnet. This is precisely what happens, for example, when children slide down a playground slide and all their hair stands up on end: the friction of sliding causes a positive charge to be built up along each hair. Each hair, therefore, has the same charge and so they repel each other and, in so doing, stand up straight.

Weather conditions that favour electrostatic energy
Static electricity can be observed more frequently during winter days when the air has a lower level of humidity: dry air is an electrical insulator, whereas moist air acts as a conductor. Water in the air can disperse the electrons people pick up while moving around, but when the air is dry, the charge becomes stronger and sticks to them: this prevents electrons from moving freely and makes it easier to get a shock.

How can people use electrostatic energy?
The energy generated by static electricity can be harnessed in several ways. Some technological equipment we use every day, such as photocopiers and printers make use of this natural phenomenon: the static electric charges attract the ink, or toner, to the paper. Factories use this power to reduce pollution coming out of their smokestacks by using charged plates which attract the smoke particles as they move up the stack, collecting them onto trays so that they can be easily disposed of. Air fresheners and dust removal products work in the same way, as do the paint sprayers used by car manufacturers to spray-paint the cars they produce.

How dangerous a spark can be
Although static electricity can be useful in so many different ways, it can also be a hazard. Some computer components, for instance, are very sensitive to static charges that can ruin them. One of the greatest dangers of static electricity, however, can occur in a petrol station during refuelling: the driver may be carrying a surplus of electrons, which could create a spark when they touch the fuel pump: when exposed to the volatile petrol, the spark could ignite and cause a fire.

Adapted from: https://www.discovermagazine.com/the-sciences/where-static-electricity-comes-from-and-how-it-works

amber: *ambra*
feather: *piuma*
fur: *pelle, pelliccia*
hazard: *rischio, pericolo*
to ignite: *accendersi, prender fuoco*
moist: *umido*
playground slide: *scivolo (dell'area giochi)*
smokestack: *ciminiera*
to slide: *scivolare*
tray: *vassoio, cassetta*

1 Read the text and find the words that correspond to the definitions.

1. A minute portion of matter. .....
2. The rubbing of one body against the other creates this. .....
3. To push away by means of a force. .....
4. The release of harmful substances into the environment. .....
5. A kind of fuel used in internal combustion engines. .....
6. The light produced by a sudden discharge of electricity. .....

2 Decide if these statements are true or false. Correct the false ones.

	T	F
1. Thales of Miletus discovered static electricity when he saw that his trouser legs kept sticking to his legs.	☐	☐
2. Rubbing two objects together can make electrons move from one to the other.	☐	☐
3. Dry air is more frequent during summer days.	☐	☐
4. It is easier to observe static electricity during summer days.	☐	☐
5. Factories make use of static electricity to reduce pollution.	☐	☐
6. Static charges can cause serious damage.	☐	☐

3 Fill in the text with a suitable word. There are two unnecessary words.

charges • flow • electronic • antistatic • ground • explosion • field • form • ignite • leakage • shock • contact

Electrostatic Energy

Each of us has probably experienced static electricity when we take off a woollen sweater and the hairs of our arms stand up. Well, that's electrostatic energy! This force can be bad, for example, when we touch **1.** ..... parts: we often underestimate how risky this **2.** ..... of energy might be under certain circumstances. Let's think of someone working in a power plant who has been told to fix a gas pipe which has a gas **3.** ..... As the employee walks onsite, they become more and more charged due to the rubbing of their arms against their clothing: when they touch the metal pipe, they feel a **4.** .....: if it creates a spark that is strong enough, it might **5.** ..... the gas leaking out of the pipe and this could cause an **6.** ..... Static electricity builds up even while we walk, through the progressive contact and separation of our shoe soles from the ground, or the **7.** ..... of our clothing with our body; and not only: electrostatic energy can also be induced when a person comes into the electrical **8.** ..... of a charged object. Wearing proper clothes such as **9.** ..... shoes or workwear can help prevent any hazards: the special fabric of these kinds of clothes attracts the charges by induction, so that they do not stick to the body but they flow over it to the ground. This prevents charge build-up on a person and their clothing and provides the static **10.** ..... with a path to the ground. In this way we can avoid shocks or even explosions.

Adapted from: *The Dangers Of Electrostatic Electricity – An Informative Video, posted by Bakaert channel*

4 Match the two parts of the sentences.

1. When you take a woollen sweater off, …	☐	a. the rubbing of their arms on their clothes.
2. A person can become charged due to…	☐	b. by providing them a path to the ground.
3. If a charged person touches a metal pipe, …	☐	c. by wearing special workwear.
4. If the spark is strong enough, …	☐	d. she can feel a spark.
5. Static electricity can also be induced …	☐	e. when a person comes near an electric field.
6. We can prevent dangerous situations…	☐	f. it might cause an explosion.
7. Antistatic clothing attracts the charges…	☐	g. the hairs on your arms can stand up