Name: _____ Date: _____

How a Copier Paints With Static Electricity

Circle group

A photocopier seems like magic. You put a page on the glass and press a button. A warm copy slides out. But no ink is poured onto the page. The copy is built from a fine powder called toner. Static electricity puts the powder in place.

At the heart of the machine is a metal drum with a special coating. In the dark, the coating can hold an electric charge, like a balloon rubbed on hair. When light hits the coating, it loses its charge in that spot. First, the drum is given an even charge. Then a bright lamp lights up the page. A lens points the reflected light at the drum.

The white parts of the page reflect lots of light. Those spots on the drum lose their charge. The black letters reflect very little light. The drum stays charged in the shape of the letters. The drum now holds a hidden picture of the page, made of electricity.

Next, toner with the opposite charge is brought close. Opposite charges attract. So the powder sticks only to the letter shapes. A sheet of paper gets a stronger charge and is pulled against the drum. The toner jumps onto the paper. Last, hot rollers melt the toner so it sticks. That is why a fresh copy often feels warm.

Questions

1. What is the fine powder used to build the copy called?

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_____

2. What happens to the drum's coating where light hits it?

_____

_____

3. Why do the black letters stay charged on the drum?

_____

_____

4. Why does the toner stick only to the letter shapes?

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5. What do the hot rollers do to the toner?

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_____

6. Why might a fresh copy feel warm?

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_____

Words to know

static: electric charge that stays in one place instead of flowing
toner: the fine powder that a copier turns into print
charge: a property of matter that makes it attract or push away other matter
coating: a thin layer spread over a surface
rollers: cylinders that turn to press or move something

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

How a Copier Paints With Static Electricity

Triangle group

A photocopier seems to work by magic: you place a page on the glass, press a button, and a warm copy slides out a moment later. Inside the machine, however, no ink is poured onto the page, because the copy is built from a fine powder called toner, and the tool that places the powder precisely is static electricity.

The heart of the machine is a metal drum with a special coating. In the dark, this coating can hold an electric charge, like a balloon that has been rubbed on hair. When light shines on the coating, it loses its charge in that spot. First, the drum is given an even charge all over. Then a bright lamp lights up the page, and a lens focuses the reflected light onto the drum.

The white parts of the page reflect plenty of light, so those spots on the drum lose their charge, while the black letters reflect very little, so the drum stays charged in the shape of the letters. In effect, the drum now holds a hidden picture of the page, made entirely of electricity.

Next, toner powder that carries the opposite charge is brought close. Opposite charges attract, so the powder clings only to the charged letter shapes. A sheet of paper is given a stronger charge and pulled against the drum, and the toner jumps onto the paper. Finally, the paper passes between hot rollers that melt the toner so that it sticks. This is why a fresh copy often feels warm.

Questions

1. What is the fine powder used to build the copy called?

_____

_____

2. What happens to the drum's coating where light shines on it?

_____

_____

3. Why do the black letters stay charged on the drum?

_____

_____

4. Why does the toner cling only to the letter shapes?

_____

_____

5. What do the hot rollers do to the toner?

_____

_____

6. Why might a fresh copy feel warm?

_____

_____

Words to know

static: electric charge that stays in one place instead of flowing
toner: the fine powder that a copier turns into print
charge: a property of matter that makes it attract or push away other matter
coating: a thin layer spread over a surface
rollers: cylinders that turn to press or move something

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

How a Copier Paints With Static Electricity

Square group

A photocopier can seem almost magical: you lay a page on the glass, press a button, and a few moments later a warm duplicate slides out. Inside the machine, however, no ink is poured onto the paper. The duplicate is assembled from a fine powder called toner, and the force that positions that powder is static electricity.

The heart of the machine is a metal drum covered with a special coating. In darkness, this coating is able to hold an electric charge, much like a balloon that has been rubbed against hair. When light strikes the coating, however, it loses its charge at that spot. First, the drum receives an even charge across its whole surface. Then a bright lamp illuminates the page, and a lens focuses the reflected light onto the drum.

The white areas of the page reflect plenty of light, so the matching spots on the drum lose their charge. The black letters reflect very little, so the drum remains charged in the exact shape of the letters. In effect, the drum now carries a hidden picture of the page, drawn entirely in electricity.

Next, toner powder carrying the opposite charge is brought nearby. Because opposite charges attract, the powder clings only to the charged letter shapes. A sheet of paper is given a stronger charge and drawn against the drum, and the toner leaps across onto the paper. Finally, the paper passes between hot rollers that melt the toner so that it bonds firmly. This explains why a fresh copy so often feels warm.

Questions

1. What is the fine powder that forms the copy called?

_____

_____

2. What happens to the drum's coating where light strikes it?

_____

_____

3. Why do the black letters stay charged on the drum?

_____

_____

4. Why does the toner cling only to the letter shapes?

_____

_____

5. What do the hot rollers do to the toner?

_____

_____

6. Why might a fresh copy feel warm?

_____

_____

Words to know

static: electric charge that stays in one place instead of flowing
toner: the fine powder that a copier turns into print
charge: a property of matter that makes it attract or push away other matter
coating: a thin layer spread over a surface
rollers: cylinders that turn to press or move something

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: How a Copier Paints With Static Electricity

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: How a Copier Paints With Static Electricity

Easier · 220 words · Flesch-Kincaid grade 3.2

1. Toner.
2. It loses its electric charge.
3. They reflect very little light, so the drum there keeps its charge.
4. It has the opposite charge, and opposite charges attract.
5. They melt it so it sticks to the paper.
6. It was just heated by the hot rollers.

Triangle: How a Copier Paints With Static Electricity

This passage · 254 words · Flesch-Kincaid grade 7.6

1. Toner.
2. It loses its electric charge.
3. They reflect very little light, so the drum there is not discharged.
4. The toner has the opposite charge, and opposite charges attract.
5. They melt it so that it sticks to the paper.
6. It has just been heated by the hot rollers.

Square: How a Copier Paints With Static Electricity

Harder · 258 words · Flesch-Kincaid grade 7.8

1. Toner.
2. It loses its electric charge at that spot.
3. They reflect very little light, so the drum at those spots is not discharged.
4. The toner carries the opposite charge, and opposite charges attract.
5. They melt it so that it bonds firmly to the paper.
6. It has just been heated by the hot rollers.