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Description

This NBC Learn video, part of a series on "Chance Discoveries" in chemistry, tells of the lab accident in 1903 that led to the development of the first safety glass -- just as the first automobiles were being produced. Safety glass revolutionized the manufacturing of car windshields, preventing countless injuries and fatalities in automobile accidents.

Keywords


Citation

Chance Discoveries: Safety Glass
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Speed, maneuverability, and safety. The automobile is a feat of engineering - electrical, mechanical, and would you believe, chemical? Look no further than the windshield, constructed from a life-saving protective material called safety glass. Able to withstand high-speed impacts without shattering, the discovery of safety glass was itself a clumsy accident.

DR. MICHAL MEYER:
In 1903, a French chemist named Edouard Benedictus had an accident with one of his glass flasks. So, when Benedictus goes to get this flask, he accidentally knocks it over. It breaks. But something very strange happens. It doesn't shatter. The pieces of glass stay together.

COSTELLO: Even after falling onto the hard laboratory floor, the glass flask had almost retained its original shape.

MEYER: When you knock over glass, you expect it to shatter. This glass, it broke, but it did not shatter. COSTELLO: After some investigation, Benedictus discovered that the flask had been used by his assistant during an experiment with a liquid plastic called nitrocellulose, a combination of cotton and nitric acid that was one of the first plant-based plastics.

MEYER: His lab assistant had washed out some nitrocellulose from a flask, obviously hadn't completely washed out the nitrocellulose when he put it away. So there was still a little bit of nitrocellulose left inside, but it was transparent, so it couldn't be seen.

COSTELLO: The fragments of glass stuck to the nitrocellulose coating and prevented it from shattering. Soon after, Benedictus produced the first sheet of safety glass called triplex, a layer of nitrocellulose sandwiched between two sheets of glass.

MEYER: When that kind of glass shatters, the nitrocellulose keeps the sheets of glass together in exactly
the same way that the nitrocellulose kept that glass flask together after it broke.
COSTELLO: Benedictus was granted a patent for safety glass in and set out to look for its first application.
MEYER: There was something special about the time period that this accident happened. This time period sees the introduction of the motorcar. For the first time, people can actually go fast.
COSTELLO: So fast, that car accidents became more and more common in metropolitan cities like Paris. After reading about the increasing number of injuries caused by car crashes and collisions, Benedictus knew his discovery could help save lives by creating a safer windshield than the folding screens used to protect drivers from flying debris. But car manufacturers saw it as too expensive. Instead, the first application of safety glass was in the lenses of gas masks worn by soldiers in World War I.
MEYER: The kind of shape we think of as a car, with a roof and windows on the side and a windshield, really only becomes popular in the United States in the 1920s. And that, not surprisingly, is when safety glass really takes off.
COSTELLO: Safety glass soon became an important component in every car made.
MEYER: It really has to wait for cars to become a mass-market product that a machine produced, rather than handmade.
COSTELLO: In 1939, the nitrocellulose in safety glass was replaced by polyvinyl butyral, a material that did not discolor and turn yellow in sunlight. Other types of safety and laminated glass have since been developed, such as tempered glass, which does not require an inner plastic layer. With countless lives saved and injuries prevented, Benedictus' chance discovery of safety glass was truly a smashing success.