

Through the Glass

The Ingredients of Optical Glasses

Debon Lee



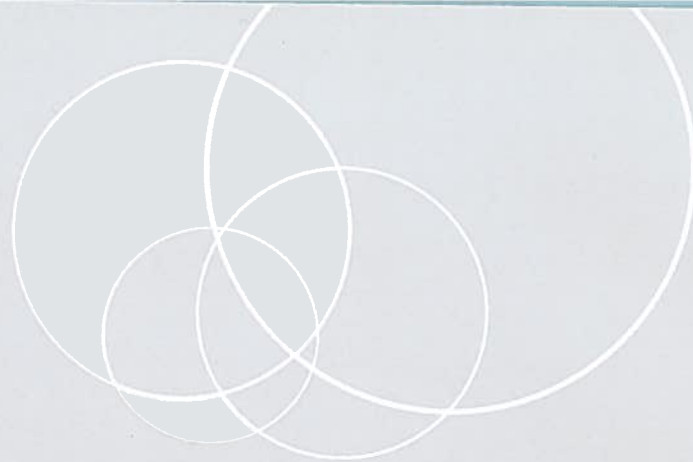
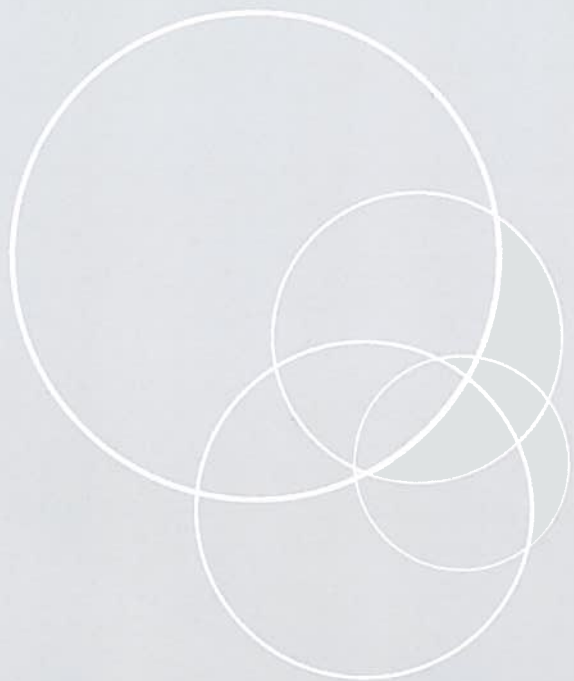


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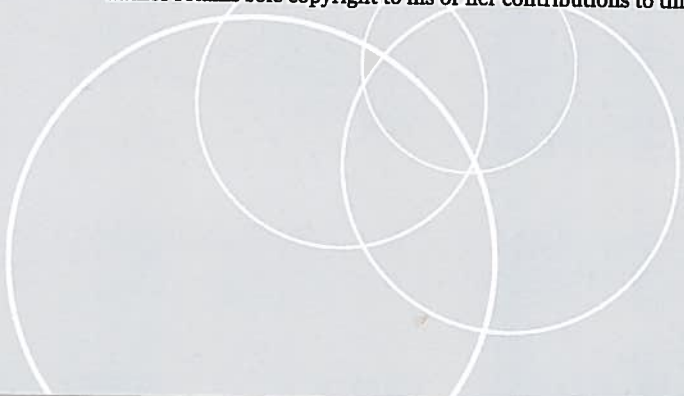
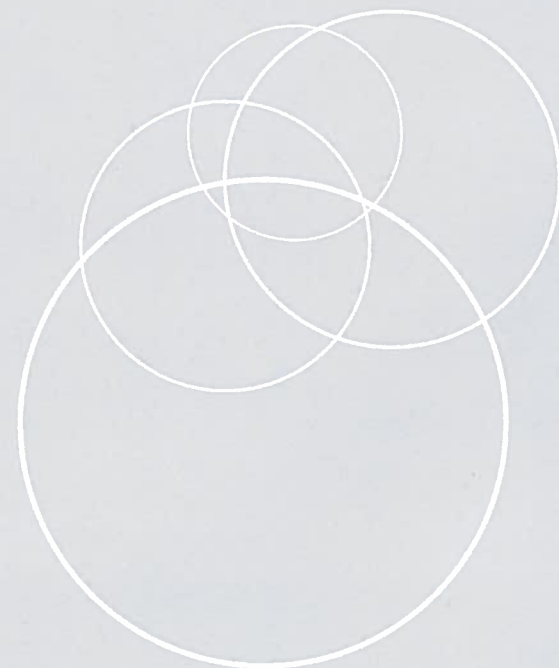




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Glasses and Minerals





Every day, people around the world wear glasses to compensate for their vision problems and have a normal life like people without glasses. If you wear glasses yourself, you would know how helpful it is. However, such a small and helpful invention can use many non-renewables. So, the question is: What is in eyeglasses, and why is the use of non-renewable resources so important?

Parts Of An Eyeglass



—▶—
Lens

Eyeglass lenses correct the vision of the user. It is made with glass or plastic. However, glass lenses are not as common now because of their weight; I will not talk about glass lenses because they are not as common.



Above: Polycarbonate lenses

There are many types of Plastics, but I choose Polycarbonate because they are a common eyeglass material. To make Polycarbonate, two petroleum refining by-products called Benzene and Propylene are changed into Phenol and Acetone via the Cumene Process. Then Phenol and Acetone are mixed with Hydrochloric Acid, which is Hydrogen Chloride mixed with water; Hydrogen Chloride is created via brine electrolysis. By mixing Phenol, Acetone, and Hydrochloric acid, you can create BPA. By adding Phosgene, (created from Carbon Monoxide and Chlorine going through a Carbon filter) then Sodium Hydroxide (made by brine electrolysis), and lastly Chloroformate to BPA, Polycarbonate is created.

Frame

The frame holds the lenses together and creates a mount for the lenses to fit on the user's face. They are made from a variety of metals and plastics. Some metal frames are mixes of different metals. Nickel Silver is one example; it is a mixture of Copper, Iron, and Zinc. Some frames are just one element; Titanium and Cobalt are two metals that are made into a frame without other metals mixed with it.



Pictures, from top to bottom:
Aluminum frame, Titanium
frame,
Nickel Silver frame

As well, Polycarbonate is used to make frames. To read about Polycarbonate production, flip to page 7.



Picture, right:
Polycarbonate eyeglass frame

— • —
Nosepiece



Above: Soft Silicon nosepieces

The nosepiece supports the frame so it sits in front of the user's eyes. One material that is used to make nose pads is Soft Silicon. It is not as hard as Polycarbonate nose pads.

Polycarbonate is also another material used in nose pads. To read about Polycarbonate production, flip to page 7.



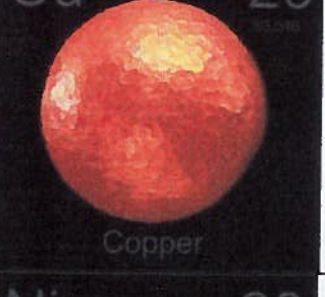




Above: Polycarbonate nosepieces

◆◆◆
WHERE IS IT FOUND?



--*--
Metals

Used In?	Element	Picture	Mined in the Provinces of ...	Mined in the Countries ...	Renewable?
Frame, Nosepiece	Titanium	 <p>Ti 22 Titanium</p>	Quebec	Australia, China, United States	No
Frame	Aluminum	 <p>Al 13 Aluminum</p>	Only refined in British Columbia, Quebec, Newfoundland and Labrador	China, Russia, U.S., Australia, India	No
Frame, used in Nickel Silver	Copper	 <p>Cu 29 Copper</p>	Saskatchewan, Quebec, Quebec, B.C, Ontario	Argentina, Brazil, China, Mexico	No
	Nickel	 <p>Ni 28 Nickel</p>	Manitoba, Sudbury, Ontario, Alberta (smelter)	Australia, Brazil, China, Russia	No
	Zinc	 <p>Zn 30 Zinc</p>	Saskatchewan, New Brunswick, Ontario	China, Australia, United States, Mexico	No








This chart lists some places where the metals described in this book are found.






Polycarbonate Materials

This chart describes
some places that produce
the ingredients used to
make Polycarbonate.

Used In?	Element	Picture	Mined in the Provinces of ...	Mined in the Countries ...	Renewable?
Frame, lens, nose pad	Salt (NaCl)		Saskatchewan, Ontario, Nova Scotia, Quebec, New Brunswick	India, China, United States	Yes
	Chlorine		Can be made via chloralkali process		No
	Water		Found everywhere		Yes
	Carbon (as coal)		Alberta and British Columbia	China, Russia, U.S, India,	No
	Carbon Monoxide		Can be created via Boudouard reaction		Yes
	Phenol (C ₆ H ₅ OH)		Not produced in Canada	China	No
	Benzene (C ₆ H ₆)		Production Facilities (4 in Ontario, 2 in Alberta and 1 in Quebec)	United States, Europe, Japan	No

Why are non-renewable resources important?





Non-renewable resources are important because they can make many useful tools in our life, such as eyeglasses, phones, and cars. They are something that we need to save for our future generations to come because when we run out, we won't get any more. So remember, if you buy something like glasses, you are using a part of the Earth that we need to protect.



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