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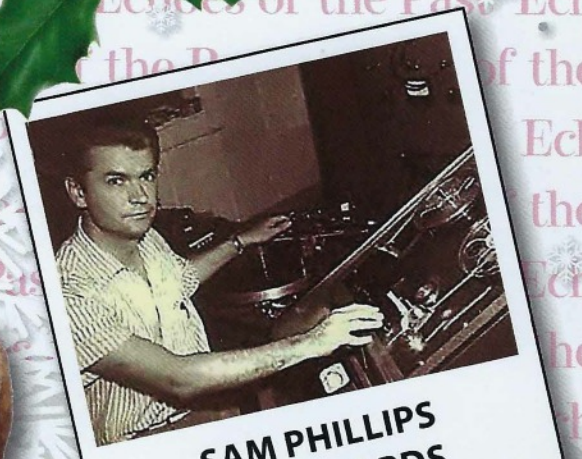
ECHOES OF THE PAST

DISCOLORED RECORDS



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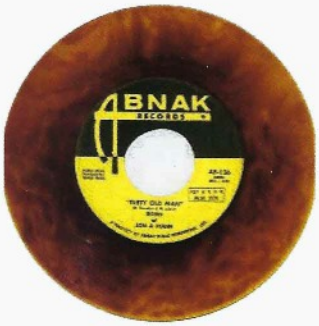

Why are my colored vinyl records slowly turning dark brown?

See Charlie Horner's article, page 4.

The Discoloration of Colored Vinyl Records: Or, Why are my red vinyl *Chance* records slowly turning dark brown?

by Charlie Horner with contributions from Pamela Horner

A recent FaceBook post raised the terrifying question, *"Why are some of my colored wax records darkening over the years? It seems records that I acquired in yellow or bright red wax are now so dark brown you have to hold them up to a strong light to know they're not black wax."*

Ever since *RCA Victor* introduced the 45 RPM single in March of 1949, colored vinyl records have been sought after by most record collectors. *RCA* started this obsession by releasing each genre of music in a different color vinyl; the R&B series being in florescent orange vinyl.

Why is colored vinyl preferred by collectors?

First of all, colored vinyl discs were often pressed in more limited quantities (rarer) than their mass marketed black vinyl cousins. That's because colored vinyl was more expensive to make than black vinyl. Reasons for why colored vinyl was used at all varied by record company. Mostly, it was used to catch someone's eye, like a radio disc jockey, though not all colored vinyl discs were promotional copies.

The other reason colored vinyl is sought by collectors is obvious. It looks prettier – shall we say, more "colorful" than black vinyl copies.

But, back to the opening question that strikes fear into the hearts of serious collectors. Some of you paid a fortune for red vinyl *Chance* records by the Moonglows and Flamingoes, only to watch helplessly as they turn nearly indistinguishable from their more common black vinyl counterparts. Many theories have been offered on social media, but none really answered the question of "Why?"

What is going on here?

This is where I come in. I'm a serious record collector who holds a Ph.D. in Synthetic Organic Chemistry and I've spent several years working in the vinyl chemistry industry. While I never formulated vinyl for phonograph records, as a research chemist I was charged with stabilizing vinyl material for the harsh outdoor environments of sunlight, extreme temperatures and moisture. And while vinyl manufacturers keep their formulations as closely guarded secrets, I can venture a pretty good theory as to what's going on.

First, a quick record chemical composition primer. While we sometimes wrongly refer to the material records are made of as wax, they are not made of wax. Edison's cylinders were made of wax back in the late 1800's, which is where the slang comes from. But phonograph records of the 1950's and 1960's were primarily made of a blend of two long chain polymers or plastics – polyvinyl chloride and polyvinyl acetate. From here on, I'll just refer to this mixture as "vinyl".

Vinyl is a [thermo]plastic which means it can be melted down with heat and molded into any shape. Pure vinyl is hard [brittle] and clear [almost colorless]. To make it useful, you must mix in certain additives. Determining which additives are used is called "formulation" and it depends on the end use. In this case the vinyl suppliers will formulate their product for the

phonograph record industry as either “biscuits” or “pellets” which are readily melted to make records.

What additives do you need for records?

You need a heat stabilizer to keep vinyl from decomposing during processing and you need a plasticizer to make it a little flexible and not so brittle. You also need a light stabilizer to protect it from light.

Now, here’s where the discoloration part comes in. Ultraviolet light (one component of sunlight) does destructive things to vinyl. Vinyl is prone to oxidation by light, unless it is stabilized. With no (or too little) added chemical light stabilizers, clear vinyl will be slowly oxidized by light, tuning first yellow, then orange-red then dark brown and finally black. That is what you’re seeing with the colored vinyl records discoloring.

Why do opaque colored vinyl records, like those children’s records we use to have (so called “kiddie wax” records) never seem to darken?

With opaque (light can't pass through) vinyl (black or kiddie wax red, for instance) the stabilizer is either carbon black which turns the record black or titanium dioxide which turns the record white. Carbon black absorbs light and doesn’t let it pass through the vinyl. Even if it did, you wouldn’t see any discoloration because the record is black. Similarly, titanium oxide is white and reflects the light back out, not letting it go through and discolor the vinyl.

If titanium dioxide is used with a red pigment (dye) you'll get (opaque red) kiddie wax. Both carbon black and titanium dioxide stabilizers are there forever and don't get used up, so the vinyl does not get oxidized. So, your red kiddie wax records are safe!

What about transparent color vinyl records? They seem to be the troubled ones.

To make vinyl you can see through it, as in transparent colored vinyl, you can't use carbon black or titanium dioxide, or else you couldn't see through it. Color is supplied by organic dyes. These organic dyes (red, yellow, blue, green) are great for giving a color tint that you can see through, but they also let the sunlight go through the vinyl and oxidize it.

So why do some transparent colored vinyl records discolor and other do not?

Some certain heat stabilizers, added during processing, also give some protection from light. Other stabilizers can be added that specifically protect against light. But these stabilizers react as they are exposed to sunlight and slowly get used up. When they are used up, the vinyl oxidizes from clear to yellow to red to brown and black. It all depends on formulation.

So, why do your colored records turn color?

When the record sees enough sunlight to use up all the light stabilizer, a chain reaction occurs darkening the vinyl. Once that happens, it can’t be reversed or even stopped. The record will eventually turn dark brown. Virtually all transparent colored vinyl records will turn dark eventually, depending on the formulation and how much light they’ve been exposed to. Some might darken right off of the processing line; some might take 100 years or more.

With some records, one vinyl batch could have enough stabilizer to protect a record for years while the next batch could have less stabilizer and discolor more quickly.

More details for the chemists reading this. Skip to the next section if this is more than you need to know.

In simple terms, a photon of UV light strikes the vinyl polymer initiating a free radical reaction, releasing H-Cl (hydrochloric acid) and forming of a carbon-carbon double bond. The more conjugated double bonds (alternating single and double bonds) you have, the darker the material gets. Free radical reactions are “chain reactions” and keep going until the free radical is somehow quenched (or it runs out of material). Light stabilizing additives are there to

quench and stop the reaction, but with each free radical quenched, a molecule of stabilizer is used up. When all the stabilizer is used up, the reaction proceeds unimpeded.

So how long will my yellow vinyl record stay yellow?

It depends on how well it was stabilized and how much light it has seen. Vinyl manufacturers' formulations are proprietary (company secret) so you'll never know them. Also, stabilization varies not only from manufacturer but batch to batch, depending on how good the company's quality control is.

So, is it all hopeless? Will I eventually see all my colored vinyl records turn brown?

How long do you expect to live? If you own transparent colored vinyl records you can store them in the dark and hope the manufacturer was good at formulating. Of course, a record manufacturer in 1954 making a 69-cent record and wanting to cut costs, probably didn't care if the record turned dark brown 50 years later.

But, some record manufacturers certainly did. I've never seen a 1949 *RCA Victor* color vinyl 45 discolor. *RCA*'s chemists knew what they were doing. On the other hand, watch out for smaller independent labels like Chicago's *Chance* label.

Which records/labels/pressing plants have been prone to this phenomenon?

My first exposure to this problem came several years ago when I read about collectors of the 1960's labels *Abnak* and its subsidiary *Jetstar* describing it. *Abnak* was a small pop label out of Dallas, Texas, owned by John Abnor. Abnor liked to press virtually all of his promotional (radio dee jay) records in yellow transparent vinyl. After about 30 years (or maybe even before that) collectors noticed that some of their copies began turning orange, then red, then dark brown and finally so dark you had to hold them to the light to see through them. [See examples on the inside cover of this magazine.] Not all of them changed color. Our Classic Urban Harmony Archives has a number of Bobby Patterson singles on *Jetstar* and they're all still yellow. However, I've had them in the dark for the past 20 years.

A recent FaceBook discussion turned up plenty of additional examples. Billy Vera has noticed the problem with some red vinyl *Chance* and *Specialty* label records. The discoloration often stars as a marbling effect as the reaction to light is a free radical "chain reaction" that starts in a number of places simultaneously.

Tony Oetjen sent us a photo of the *Bab* label's Maria & the Autumns record that he purchased in blue vinyl. It is now virtually black. On the other hand, member of the Autumns, Joel Katz' copy has remained a vivid blue vinyl. The record was pressed at Sun Plastics in Newark in such small quantity it almost certainly was from the same batch of vinyl. Joel kept his packed away in the dark for the past 39 years, while Tony presumably played his copy. Tony also scanned two copies of Gus Gossert's New York Doo Wopp album Volume 6. The record was only pressed in yellow vinyl. One of Tony's copies has remained yellow, while the other slowly went to yellow orange, orange and brown multicolor and finally almost all black (see photos on the inside front cover of this magazine). Since both copies probably saw the same environment, this might have been from two different batches of vinyl.

Yacov Estrin is an avid collector of bootleg albums and has many examples of early 1970's colored boots changing color [See the photos page]. In this case, Estrin reports that most of the bootleg albums were from the same *Trademark Of Quality* label, and were probably pressed at the same plant between 1971 and 1973.

One set of interesting records that have shown evidence of turning are Grand Funk's "We're An American Band" 45's and LP's. Pressed in yellow vinyl, so many copies have discolored that the record is often sold as "orange" or "brown" vinyl in record auctions.

As with any scientific theory there are always some unexplained examples. Yacov Estrin has

two copies of a yellow vinyl Elton John LP, presumably of the same formulation. One he put away and the other one was his playing copy. The playing copy saw much more light, yet it stayed yellow. The one that rarely saw any light has turned orange [See the photos]. Obviously, there is something happening here that we don't know about. Even if these albums were purchased together, it's possible they came from different batches. Or the mold could have been hotter or contained impurities. Certain impurities are known to increase light absorption. At this point we'll never know.

Which brings me to some other questions I don't know the answer to. I have a number of mid-1950's records that appear to be dark brown vinyl. For instance, my Bobby Hall & the Kings "You Made Me Cry" on *Jax* is so dark red, it's almost brown. I believe it's turning. My "Dear Lord" by the Continentals on *Whirlin' Disc* is dark brown vinyl. Did it start out as red vinyl and quickly turn before I got it (maybe right off the press)? Or was it intended to be black vinyl and they didn't add enough carbon black making it dark brown translucent? Some records appear to have been made purposely in dark brown vinyl, like some copies of almost all the *Beltone* label records. Why make records dark brown vinyl when you have to hold them up to the light to notice? Vinyl record formulations are kept confidential by the manufacturers, so we'll probably never know. But these questions keep me up at night thinking about them.

I'd be glad to hear of other records that have discolored. For that matter, I'd be glad to hear any alternate theories as to what is happening, but for now I need to go and see if my red vinyl "If I Can't Have You" by the Flamingos has gotten any darker.

Photos on inside front cover..

Down left hand side:

Different stages of discoloration of Abnak label promotional copies. All started out yellow.

Right hand side:

Row 1: Gus Gossert New York Doo Wop album Volume 6. Yellow and dark brown vinyl copies. Both started out yellow. Courtesy of Tony Oetjen.

Row 2: Flamingos red vinyl Chance label records. Left is still red (from Classic Urban Harmony Archives). Right (courtesy of Billy Vera) has begun darkening.

Row 3: Left, green vinyl bootleg LP that has begun turning (courtesy of Yacov Estrin). Right, red vinyl Specialty label single that's begun darkening. Courtesy of Billy Vera.

Bottom: Two copies of an Elton John bootleg that were purchased in yellow vinyl. The one on the right has discolored even though it has seen less light. Without more knowledge of the batch formulation and record history, this remains an anomaly.

Acknowledgements:

This article just shows that there are still aspects of record collecting yet to be uncovered. Our thanks to the following people for their insight and help in putting it together.: PJ Noce, Billy Vera, Tony Oetjen, Jim Santa Barbara, Yacov Estrin, Ray Steeg, Fred Bohn, Stevie Dunham, Joel Katz and others.