

Dan Coppins

[00:00:00] **Jen Novakovich:** welcome back to The Eco Well podcast. This is a show focused on the science of skincare. I'm Jen, and I'm your host. some quick housekeeping. Before we dive into the show, our YouTube E panels are making a comeback with the first one next Friday, February 3rd, taking a look at the B S bandwagon. We're also planning an e-conference March 6th, the sustainable beauty e-summit, both are totally free and you can find all the info and tickets on our website to kick off season six of the show.

[00:00:44] This week, we're taking a look at the number one thing people think about when they think about sustainability packaging. Plastic is one of the first things that comes to mind when we think about the horrible damage we're doing to the planet and no doubt it's a contributing factor, but does it play the role we all think it does. Is it really the villain that we just need to defeat? Should we aim to remove plastic completely from our supply chains? Or is there room for nuance? joining me today to dive into this nuance is Dan Coppins. Dan is a packaging technologist, which I better let him explain exactly what that means. And so without further ado, let's start with the show.

[00:01:35] Okay. So I'm here with Dan Coppins, Coppins yes. How do you say Coppins? Oh, I got all right. For the first try, maybe just to get started, because I think some of my audience at least might not be familiar with the type of work that you do. maybe they don't know what goes on on the backend of packaging.

[00:01:57] So could you describe what you do?

[00:02:01] **Dan Coppins:** So packaging technologists also known if you're an American, uh, engineers, packaging engineers, it's our responsibility to understand from cradle to grave, the material choices and where they come from, how they're made, what we decorate them with, what they're going to be used for how to dispose of them in the relevant market that we're selling the product in.

[00:02:20] That's our job. And obviously fundamentally you, Jennifer it's that interaction with the formulation as well. Making sure it's suitable for, for the product that you're creating. Part of our job is obviously to make sure that it's pretty and people want to buy it, but we've got to make sure that no matter how pretty we make it, it's still fully recyclable. That's a very big thing in the

industry at the moment. And it's something we need to focus on and I'm sure we'll be touching on a lot of that in the next sort of hour or so.

[00:02:43] **Jen Novakovich:** Now when cosmetic brands want to launch a product, what are some of the things that they need to go through on the packaging side with their formulation, I've interviewed a few packaging consultants and they often work hand in hand with the formulation chemists to produce the product. So how does that go from your perspective?

[00:03:08] **Dan Coppins:** Again, I mean, very sort of like the packaging consultants are essentially the same position as I'm in, except obviously the difference for me is I'm employed by the producer of our packaging or for of our product. So I get involved straight away. There's no commercialization for it.

[00:03:23] I'm paid either way. So it's my job to do the best I possibly can. Consultants, you know, obviously they have to make an income. So they're balancing different things than I am. I can speak the whole truth and nothing but the truth, because either way, I've got a job with the business consultants. Obviously you've got to have that a little bit more careful because you still need to be honest, but you need to be able to back off easier because your at the end of the day, you know, you're consulting for them.

[00:03:47] My side of it is very much similar working with formulations. So we need. What we're producing. We looking at something that's going to be fluid. We looking at high oil content, high alcohol. Are we looking at an aerosol is understanding what the consumer requirement is. And naturally it's all about the consumer for the first part.

[00:04:04] Cause you need to have a product that people want to buy. That's the fundamental of everything we do once we've done that, obviously the formulation chemists will do their thing. They will design a product and say, this is what we want. Now this will go for whether it's food, pharmaceutical or whether it's, you know, cosmetics doesn't matter. It's all the same processes. We have a, this product that is in this form, sort of solid liquid or gas. Yeah. This is what it does for the consumer. Our job is then to look at that formulation and understand what the sensitivities of it are and we'll work the formulation chemist to understand that. Is it sensitive to light? Is it, you know, UVS particularly in light? Is it oxygen? You know, what is going to cause this to shorten its lifespan? And then using that and understanding that we can start looking at our packaging repertoire and the materials that are available in the m-

industry in order to make sure that it meets those requirements to protect the product.

[00:04:55] And that is absolute key is protecting what you're selling. So for a I'm sure you've seen a lot of alcohol is sold in green or brown bottles. The reason for this is green and brown actually filters out the UV light from the normal light rays, which can extend the life of the alcohol. The- more specifically the flavors and everything that goes in it.

[00:05:17] Now there's nothing that's going to be damaged by the UV light because it's filtered out through that brown glass. And that's one reason that glass uses that color in cosmetics. A lot of the time we can get away of clear glass cause you'll have a carton or something. So even if the formulation is sensitive to light, we can use something to protect it further.

[00:05:34] When it comes to application- has to flow, has to come out. Whether you look talking about blister packs with medication blister packs, it's a bit more technical with them, cause obviously got the aluminum foil or plastic, but that plastic isn't just plastic that will have a EVOH or protective barrier within that plastic to protect from moisture from oxygen.

[00:05:51] Because although these materials look solid, they're all made up of these molecules and you can get gases or fluids that can work their way through over time. And you still need to protect against these. This is where the issue with sachets recyclability comes because of the way that they're constructed multi and complex multi laminates.

[00:06:09] That is a complex subject, and I dont think you want the kindof massive detail on that. But there's a lot involved within that. Why we choose these things and it really does depend on, on the product that they're trying to, uh, work for

[00:06:20] **Jen Novakovich:** Okay so, maybe for a solid base or a decent base and okay. Base, maybe we can do it like a broad overview of the different materials used in packaging.

[00:06:35] This is a big question. So answer it how you will, but the many types of plastics out there, what are the pros and cons and then glass. And then people I find in the cosmetics industry are trying to move towards cardboard packaging. So pros and cons of that as well. And aluminum. Whenever,

[00:06:52] **Dan Coppins:** I think these are the big questions aren't they? Let's be honest is, you know, the material choices. Now this- is the complication with the subject is markets. So the US market has, unfortunately a quite a woeful recycling system it is improving. And I've seen a lot of evidence to show that more development is being done. More understanding of this is happening and the us put a lot of money into fixing the systems.

[00:07:15] But if we stick with UK, the market, I know best that's where I live. So the UK industry for recycling is very, very good. We have quite large curbside recycling though. They have limits. So when we're talking about papers, cardboards and any pulp wood based material, these are the go-to for a lot of sustainable clients.

[00:07:37] So most people go, oh, it grows on the, it grows in the ground is sustainable. So we'll, we'll cut them down and we'll turn them into paper and we will make that to protect our packaging. Now, paper in wood form or crop form is fantastic. Material really is a very durable material. The one thing that really lacks, which I think we're all aware of is protection against fluids, water, liquids of any sort, just, it's not good, very absorbent. So if you wanted for an absorbing pad on fruit, fantastic. And there are things that I've seen that are really, really good technology with this using glucose fibers and things, but when it comes to these bottles and things that are, yeah, we're all paper, it's not possible. It's just impossible. There are ways of doing it with varnishes, but a lot of the ways that we've seen is very much green washing, which we all know is an issue.

[00:08:28] And they're building plastic bottles within the paper bottles, for example, which is just not right. But the biggest argument for me, when you let's take single use forks spoons that come with your takeaway foods, these are. Uh, now because they've banned in a lot of Europe, they've banned the single plastic. The issue we've got is yes, they're fantastic. Okay. Yet we can recycle. That's not a problem. The issue that we have with that is the footprint to get there. So wood is known is a sustainable material, and it can be used several times before it breaks down. When you recycle cardboard or any word, remember you're making these chains of fiber shorter and shorter.

[00:09:13] Every time you turn it into something new and it becomes less effective is what it does. It becomes weaker as we do that. And you can do less structural things with it, which is to be honest, Wood's biggest benefit is the structural side. People have done to this wood because plastic has been banned. Personally, plastic bans, horrific, horrific for the industry.

[00:09:33] And the reason for this is plastic is incredibly durable. And my go-to with this is when we talk plastic bags. The thing that comes to people's heads is the plastic waste in the ocean. I don't want to go too much into that detail because there's a lot of that could take us an hour on its own. Just touch that subject.

[00:09:50] But if we look at plastic as a wonder material that it is, and it really is a wondrous material, but it's, this is a material that was invented by a guy who was fed up, seeing trees cut down. So he invented this material. This plastic that is durable can be washed, can be reused multiple times. And he made this plastic bag and he kept this plastic bag, his entire life washed it when he needed to and reuse and took it with him everywhere to stop so much paper bags being used so widely because it was damaging the environment.

[00:10:20] So the plastic bag was invented to protect the environment. And it does this by not breaking down as quick as. It's a material that, I mean in the modern age is so easily available. When you think of plastic plastics produced from a waste material that is may need during refraction process for making fuels for cars, for ships, for everything, airline fuel, it's part of the crude oil refraction process.

[00:10:47] You get these oils. So all plastics are made of this base oil, except bio-plastics. Which again, we'll go onto in a minute, but with the crude oil plastics, you turn this into plastic and use its durable you can do what you want with it, depending on the applications to different types of plastic, you can bake with it would depend on the polymerization process, which I won't go into detail on today because that is again, quite complex. And I'm not the expert in that field.

[00:11:12] **Jen Novakovich:** Maybe we can sorry to interject. This is a constant bugbear of mine, uh, that people, and you know, it's not just our industry. We see this in grocery stores, as you were talking about the bands for single use plastic bags in Ontario, we now have this, and now we've switched to, depending on the store, it's either paper or fabric.

[00:11:33] And I think people just don't like to think about these topics deeply because as soon as you go and look at it and LCA. It's drastically higher impact. So I just wanted to bring up just because it was relevant to what you were talking about. A report in from 2011 by Kim Raggert, who is based in Europe.

[00:11:52] I think she's in, uh, in, uh, Germany, but she, she did a LCA comparing a thin plastic bag to a recycled paper bag. And the plastic one is approximately 20 grams compared to approximately 50 grams for paper, which requires more energy to make, recycle as well as more resources to produce in the footprint of the plastic bag was so small that you would have to reuse the paper bag four times for it to be more environmentally friendly than the thrown away plastic bag, which also doesn't have to be thrown away.

[00:12:23] And here in where I'm aware, I live in Ontario, we recycled plastic bags. So I just wanted to, I just wanted to stick that in there because there's a lot of black and white ideas floating around about plastic. Everything else.

[00:12:38] **Dan Coppins:** You're absolutely right. I completely agree. And the report you've done, there'll be an interesting thing.

[00:12:42] Actually, a friend of mine, Krista Armet wrote a book, the plastic paradox, and he's got a, he's done beta, a thousand hours of unpaid work to collate, a lot of LCA on plastic and dispel a lot of these plastic myths, just aren't true. And if anyone has a chance, I recommend checking out the website, all the data's on there.

[00:12:58] Really interesting read. If you liked doing the dirty packaging stuff, it's fantastic. It really isn't. It's a good, good understanding of more facts about plastic. And this is a really good reference for me to go to really nice guy, very passionate about what he does, and it's really good source of information.

[00:13:13] Talking about plastic bags, and obviously paper bags, the weight is just one of the issues you've got water usage, energy usage is huge. And I challenge you to name a single person that you've ever met, that you reuses a paper bag from my experience, doesn't happen.

[00:13:26] **Jen Novakovich:** Or more than once. So, you know, in Ontario, like I know a lot of people that will use the paper bags for compost, but then all the resource loss, if you're only using it once and then sticking it into compost,

[00:13:40] **Dan Coppins:** you'll still placing that carbon, back in the ground. You're not reusing it sort of still using more energy than the bag completely. You know, it's a, it's a nice idea, but it doesn't work in practice with a plastic bag. It's fantastic because you can reuse it, you can wash it, you can use it. You could

use that. You know, hundreds of times I've got plastic that I keep in my bag all the time on my rucksack I've got a plastic bag.

[00:14:00] If I need something to carry or something extra, I've got a plastic bag in there. In the UK and I recommend this around the world. It's changed things. I have put some facts on LinkedIn on this in past. Can't remember off the top of my head, but we in the UK a couple of years ago, bought in a carrier bag charge. Now we were using millions of tons of plastic bags a year because they came in the supermarket.

[00:14:22] You picked them off enough. So you pack your stuff and off you go, and you could have six or seven of these. What the government did is they said, enough is enough. This is a problem. And it was a problem we will using far too many plastic bags because people weren't reusing them and they're using the one single use.

[00:14:34] We've got them a little bit, but weren't necessarily recycling them because there isn't any curbside recycling. You have to take to the supermarket to recycle them because flexible plastic, which is a separate issue that I'm campaign to try and get something changed so that we can have curbside. But it's not that simple- with the plastic bags being reused. And the, in this bag charge is you saw dramatically people stop getting so many plastic bags because you had to pay 20 p a bag well, what that meant is people will need to what they need to because they've forgotten their bag, whatever. And we've got a car here with a boot full of bags that we can just take to any supermarket.

[00:15:10] We just got back and you take them out, you reuse it. And it encouraged people to bring these bags back and use them the second time. Now, if a paper bag takes four times its use to become a plastic bag. If you then reuse that plastic bag 10 times, and this is the difficulty people can't get their head around is actually plastic is very, very durable and it can be used in so many ways.

[00:15:32] And actually our modern age wouldn't be possible without plastic. The space age just wouldn't have occurred. The technology age would never come here because everything, you know, if you look around, look around your desk at the moment, what have you got on your desk that isn't made of plastic. It's because it's so easy and durable.

[00:15:49] Now, when this all came about, people are fantastic, brilliant material, really brilliant material, but people didn't think about what happens

afterwards, which is obviously where we are. Now. We're saying class a climate crisis and plastic is a big problem in here. And yes, to a degree, it is, it's not the problem. Plastic waste in the ocean is 0.4% of the waste in the ocean.

[00:16:14] **Jen Novakovich:** We kind of skipped over the nuance here. We're not trying to belittle the issue of Marine debris. Plastic makes up the vast majority of debris found in our oceans today. But Dan wasn't speaking to debris, he was talking about pollutants. The impact of our world's trash crisis is yet to be fully realized.

[00:16:36] But I think what Dan is trying to convey here is that there might be bigger fish to fry at the moment, by focusing our attention on all the floating microplastics that has been accumulating since before many of us were born, we might be throwing the baby out with the bath water.

[00:16:54] **Dan Coppins:** But when we're looking at plastic waste, what we do with it, we had, since about the fifties or sixties, it was very much, you know, we came back out of war and we're sort of settling back down into a normal routine of peace.

[00:17:07] And what happens is peace is obviously people start getting into routines and comfort, and we started developing this packaging that was convenient. And most of the packaging you will see out there is a convenient way of doing something. It's not practical. It's not, it's not functional. It's convenient.

[00:17:23] It's pretty. We like it. So we had cosmetics were really bad for this, but particularly in fragrance, you get these things made that you couldn't make it. In shapes that just weren't possible with the glass other materials because of the way their made you know you've got, you've got your gobs and you've got your molds and these things and the materials you weren't, you were using didn't flow in the same way as plastic.

[00:17:43] Plastic is quite a low melting temperature. So you can make these really exciting shapes. So as time went on, we went, oh, we wanted more fashion. We want to add these two materials. And so it's soft touch. And suddenly you've got these two plastics in one component and it becomes difficult to recycle, but recycling, wasn't really a thing.

[00:18:00] People didn't think about it. What do you do with it in, in kind of the sixties, seventies, you put it in landfill and it varied and you forget about it. But

the issue with landfill is you've got a finite varied amount of oxygen. And once that oxygen's degraded what it can't degrade anymore. And you get these methane as the offset, which is what a lot of the landfill actuations have and you've trapped in the car, carbon, under there, but deep down inside, you've got an apple in there, an apple core that hasn't rotten because it hasn't got the oxygen there. So it's just there in suspended animation. This is the issue with landfills. The modern sort of take on this as incineration and energy recovery, which is all good. And as long as we're capturing the carbon, but that again is expensive, but all of these things are very intrinsically linked. The way we're looking at the future, everything becoming very electric, the electrification of everything.

[00:18:50] We've got to get this energy from somewhere. And actually plastic is one of these resources because we won't be using the fuel, but then we're going to look at bio-plastics and bio-plastics have to come from somewhere as well.

[00:19:00] **Jen Novakovich:** Oh, maybe we can, maybe, maybe we can talk about, because there's this, it's a fallacy really, the assumption that natural will be better. And like, In the conversations about plastic and cardboard, that's like, kind of at the root of it, we're taking steps back. We're forgetting, we're forgetting about the like technological advantages. And then thinking like, oh, back in the day we did it this way and it must be better.

[00:19:23] Like, it's just a fallacy, but oftentimes that's, what's communicated in industry and you know what, like humans just tend to think this unless they think a little bit more critically about this and it's easy for marketer's to. So, so then switching over to the different types of plastics, because I have read some interesting stats comparing bio-based plastic and non bio-based plastic that maybe puts a rift in that assumption that renewable must be better than non-renewable.

[00:19:52] It's an easy assumption to make, but it's just not always aligned with reality as far as I can see, but I would be interested in your perspective on what I just said.

[00:20:03] **Dan Coppins:** So. And this this'll be interesting to confusion. And then a lot of people get this confusion because the community isn't allowed to communicate a lot and the media likes to bash on plastic and kind of gives a bad rep.

[00:20:14] When we talk in bioplastics, when you hold a Petro plastic, we call it next to a bioplastic. The difference between these is normal, there is no difference. They are the same polymer. They could be recycled in the same way through the same route. They are identical. The only difference is the source. So when we're talking petrochemicals, obviously we know refraction, the oils take on... Turns in plastic, very simple flood process, admittedly, but that's the essential process.

[00:20:44] When we use bioplastic, we grow a crop. We squeeze it. Like if you're getting olive oil or whether you're going to kind of get or anything else and we turn that oil into plastic, once it's past the polymerization point, it is just plastic. Bio-based source Petro based sourced creates the same plastic. The confusion here is when people are talking about biodegradable plastics, I mean, all plastics, technically biodegrade.

[00:21:12] And if you leave plastics out in the sunlight, they will biodegrade over time. And no, it doesn't take 2000 years. It takes about four or five years for, for a regular plastic bag. Now, the evidence of this is actually in everyday life, but people overlook this because the media are interested in sharing this.

[00:21:28] And if you actually look at agriculture, you've got polytunnels where I'm sure you've seen them. polytunnels full strawberries, things like this. They actually needs to be placed, replaced every three years because they break down and they fall apart. Now. Bear in mind that these poly tunnel plastics are built with additives and things put in there for UV blocks.

[00:21:49] They protect themselves from this UV, the break it down, and they break down in three years with this extra protection built in. So actually if you leave a bit of plastic in the environment, it will break down quicker than people expect. But the caveat on this, there are certain conditions that this works.

[00:22:07] There are certain conditions that it does not work as much obviously heat has a part to play in this as well as with anything biodegrading heat is a really important part. I'm sure everyone listening is kind of being around a compost bin, uh, in the garden. Because that's the process. It's the excess energy coming out for the process of composting.

[00:22:30] So it's decomposition calls. Now, when we're talking about biodegradable plastics, it's actually an additive much like the UV protection, the biodegradable part is an additive that is added into the plastics. Generally. Now, when you have that additive added into the plastic, it renders it not recycled.

And if you do try and recycle that plastic with regular plastic, you will destroy the recycling batch you added to because it's then got this composting additive within it.

[00:22:59] So biodegradable plastics, not fan of, or recommend against it because it's so against the circular economy that we're trying to implement are sort of live with it. If we start adding these, then it doesn't. And of course with biodegradability, there's extra levels of complication because biodegradability and compostability, which is a non-term really, I mean, you get industrial composite ability where it has to go through an anaerobic digester where waste food would go, and it's only broken down in very specific circumstances.

[00:23:32] The other one you get is home compostable, which is a new certified thing. And I don't know for certified in the U S needs to be. Which means you can compost it at home, in your food waste bin and levy. And it just goes through the process and it break down over time. Now we did an experiment, this and the nineties I saw when I was a lot younger and we had these bags and they used to follow up on people.

[00:23:54] You'll be walking out from the supermarket and the bag would get wet and it just fall apart. And it didn't really work because, and the problem there is then you've got microplastics, which is another topic, plastics, and, and he's not really what you want. It's not ideal. We want plastics to be robust and tough.

[00:24:09] We want to reuse them. Recycling is the best outlet for them. If we can't reuse them. But what we need to be doing as an industry at the moment is looking how we can reduce the use of resources, not plastic, but any material. We only need to use what we need to use. Fabrication. Anything else is excess and actually waste.

[00:24:27] So that's removed, reducing obviously how much we need. So we take away what isn't functional, reduce, what, what we don't need replacing with another material. If that material is better and recycling, obviously as large as all we want to recycle and reuse were times plastic isn't infinitely reusable. It does only get sort of, you know, kind of 50 uses out of it tops really.

[00:24:48] But when you start mixing that with new recycling comes through, you can get more use out of it because you're mixing the chemical chains. You can talk about chemical recycling, which gives it longer health and different types of recycling. These are different ways and that, again, that's bad for

recycling routes and you've gotta navigate this. And that's where people like myself and other technologists and engineers will we do this work for companies we will go around and a lot of your consultants will do the same. They need to understand where's it coming from? Where are we digging out from? Where are we burying it in whatever form it is, are we burning it?

[00:25:20] And it's going into the atmosphere. Are we burning a capturing it? We are, what are we doing with this stuff?

[00:25:25] **Jen Novakovich:** And I, I just wanted to add in, I meant to make this point earlier, but regarding the trend for quote unquote bio-based plastics. So the research that I was looking at. Obviously the end material is the same, but the sourcing.

[00:25:39] What about the sourcing? So they were looking at the issues with diverting agriculture, which is right now we know the largest impact for biodiversity loss. And also we've got a growing population. We need agricultural space to feed the world because starvation is a thing. Yeah. So the impacts there, and then they were also looking at the pre.

[00:26:02] LCAs that were done to compare because oftentimes you'll see, LCAs giving bio based plastics favorable LCAs, but then they go and look at the LCAs and they haven't considered the agricultural space requirements or the sourcing of it. They only go from that point and then consider. And so it's not considered within the LCA.

[00:26:25] I just wanted to add that in, just because I find that there are just these assumptions that are constant in industry, and I think it's important to just kind of poke holes in the.

[00:26:37] **Dan Coppins:** Completely. I mean, LCAs is a, it's a tricky one. They're not Bulletproof. They are not perfect. And you know, the LCA is only as good as the data you're gonna put into it.

[00:26:47] And it's difficult to know when do I start on LCA? At what point should they start? Do we talk about, you know, LCA for plastic if it's a Petro plastic? Did we talk about it taken from crude oil. or do we talk about it. Post refraction. Do we talk about it when it's actually turned into plastics ready for manufacturer?

[00:27:03] And the same can be said very much so, of bio based polymers, when are you going to start measuring this from. From seeding of the crop or from harvesting, or actually are you doing it again from, from the, the pellet creation that's going to manufacturers. And this is the issue with LCA is, and why we need to be careful when they look into LLCs and details, because you need to understand these studies, where is your starting point for these tests?

[00:27:29] To our other point, with, with the crop, this is my biggest bugbear with biopolymers. Now we should get to a point where we can reduce the amount of Virgin plastic reusing, and that's whereby plastics might be able to play a part in recycling, circular economy. Again, this is all blue sky thinking and the ideal world, which I know we don't live in, but the idea is actually you get a bit of byplay then based polymer and you mix it in with your recycler and extends the life a bit longer and you can reuse it and reuse it and reuse it.

[00:28:00] And you actually do need a little bit of action in that for making the new, new, uh, polymers, not. You said the issue for me with bio-based. Where's that coming from and of what expense there is huge world hunger is a real big problem. And, you know, speaking to you from my position in a first world country, we both don't understand the full impact of that hunger.

[00:28:26] And we can't do because we are privileged in that way that we don't have to worry about that. You know, we can go down the right to the supermarket and buy food. There are people in the world that rely on these grains to feed basic basic foods. If we start using that land, not to feed people, the growing population, and we turn it into plastic.

[00:28:45] Instead to me, that's a waste of material or resource that should be used to sustain life bio-based has its place, but the LCA's is every single one I've seen every kind of supply chain I've looked at for that buyer base is not as good for the environment as recycled material because that recycled material has already been used.

[00:29:09] And every time you reuse it, you reduce the impact to the environment because it's not taking more out of the earth.

[00:29:16] **Jen Novakovich:** And I find that there's a lot of, there's a, I mean, this topic is so broad past, past packaging. There's a lot of these, like these assumptions within the "green", I would say the pseudo green, because they're just like, I, sustainability is something that's very important to me, but like, we

can't move forward positively if we're not going to like, take an honest, look at the science and then move forward with that.

[00:29:42] And not just base our decisions based off of what feels right. And like a lot of the times what feels right. Isn't right. So you can't just do that. Okay. So the next two materials, maybe we could just like briefly go over before we get to the Patreon on questions are aluminum and glass.

[00:30:02] **Dan Coppins:** I mean, first of all, of course you pronounce it wrong.

[00:30:04] Uh, I'm English it's "aluminium" it's gotta be thrown out there. There can never be forgiven that one. Um, so when we look at, I mean, we'll, we'll tackle them aluminum first, um, aluminum, aluminium, same thing. When you start looking at the sourcing and I don't know if you've ever looked into aluminium mining. Um, but the sourcing of aluminium is incredibly unethical.

[00:30:29] I mean, it has a human cost, but the advantage of aluminium is it is a hundred percent recyclable and it's a fantastic material, but it is limited to shapes and what you can do with it. It's very good for aerosols and things because you've got this burst pressure and how you produce it can be really, really clever.

[00:30:47] And I don't know if you've seen these factories or kind of understand the process, but you get stamped coins and make these shapes out them, which is why you get quite cylindrical shapes normally. Cause they're stamped. It is a fantastic material. It's really, really useful for the right applications. And the issue with that is obviously you can react with some, so you often need to line aluminum with some sort of lacquer for long, like a lacquer for aerosols, for example, to protect the formula from oxidizing or having any issues with this aluminium.

[00:31:17] Cause obviously it doesn't oxidize in the same way, but it can still react. There are still things in it, but element is brilliant because it is a full barrier. So when we say a complete barrier, we mean in packaging, that nothing can get through it. No air, no gas of any sort, no light, nothing can penetrate eliminate, which is why it's fantastic so you can put anything in that, aluminium you can close it, you can bury it. And when you take it out, if you remove the air and flood it with nitrogen, nitrogen, whatever you've put in their food stuff will be exactly the same as left it. It won't change because it is protected from everything. That's what is brilliant about aluminium.

[00:31:56] And when you're done with it, you send it into recycling, they will melt it down and they will turn it into something else. And in theory, it is perfectly circular. The big issue with aluminum, um, is weight it's a metal is heavy, even though it was a light metal. It's a lot heavier. When you look, when you're looking at kind of comparative against plastic and things.

[00:32:15] And again, you're getting back to that transit issue of how you sort of move that around and actually what's the most efficient way and the shapes can make a difference because you don't want to be shipping air. And there are other things with aluminium that, uh, have caused the issues. But as a material is wonderful.

[00:32:33] I love aluminium it's a really beautiful material visually, and there's a beautiful material to use as a barrier material and sort of work around it. Um, but it is that weight that causes the issue. Glass is very much the same, you know, glass has been used for centuries and millennia, even. It's a very good container.

[00:32:54] The only thing it can't do is block light, which is why you coat them and spray them and make them, you know, decorate them in certain ways to protect it from the lines as well. Now, with glass it's the energy used to create a glass it's heated sand plus a bit -I'm simplifying, but these furnaces run at three and a half thousand degrees. And you can't switch them off. They are constant. They are always on always, even through anything you can think of, they will still be running. They do not turn these things off because it costs even more to fire them back up again. So this, you've got to think about that every time this is going through the furnace and you're putting the color in and it's coming out the other side, turning to gob.

[00:33:34] Blown into the right shape and kneeled, all of this takes energy. Now this is a lot more energy than comparable plastics, because this is what we're comparing against us. What everyone gets is, oh, we'll replace plastics with glass. It doesn't work that simply because the energy is absolutely astronomical.

[00:33:52] When we apply glass to cosmetics, it's even more complicated because glass is a, it's a very organic material and it does its own thing. It doesn't do, as it's told it likes to misbehave, it likes to go, oh, I'm just going to have a bit of a thin spot here, which makes it cracky. And there's, there's all sorts of, you know, kind of material issues when you're turning this into packaging that you can't foresee until you're there.

[00:34:17] And this is why glass has a huge failure rate gets smashed back down and re melted. The tolerances on glass are huge. You know, kind of when you've got a 0.5 millimeter tolerance with plastic, have a three or four millimeter, you know, kind of up to three or four millimeter tolerance with glass because it just, it cools down a different way. It takes longer to cool that it's a very different material. And again, it's very, very heavy because the nature of what it is, again, this is why plastic has replaced a lot of glass. If we go no more plastic, when we start using these other materials, it's the weight of this is really going to kick you in the backside and the moldability.

[00:34:56] You can't mold this into as pretty shapes as plastic as easily. Yes, you can make very lovely, beautiful glass sculptures, but it takes a craftsman to do that, to get a plastic, to do the same. It takes some mechanic mechanical engineer. So they can design a mold and it will do repeatedly, repeatedly, repeatedly, which is what we need in any engineering field is repeatability key, especially for production.

[00:35:22] It's harder to do that with loss costs, a lot of money to get, make sure that that repeatability is there. That's why there's a high failure rate because it's not as easy to create that method. And that process plastic is much easier. You've got a mold you make it is done. It's going to be the same because it's that lower temperature, that to kind of make it into a fluid and that it molds into the shape.

[00:35:43] And it's it cools quite quick as well because it's much thinner material, but the molecular structure means it's just as strong. And in some cases, depending on the plastic, stronger the glass, I mean, when's the last time you smashed a PET bottle? I'm going to say probably never because it's flexible. Which glass is not.

[00:36:00] And that comes with other issues. When we're looking at looking at it for packaging, it's actually, how do you move this around? Have you moved without breaking it? If you want to do something e-commerce and post it out to consumers, it is a nightmare to do something with glass. You need to have extra packaging within that e-commerce box to protect it.

[00:36:18] If you've got plastic bottle, Chuck it in a box, jobs are good and you don't have to worry about it because it's got those properties that actually it's got that memory to what it is. Glass is brittle it will shatter, aluminium will dent. It will change shape, and it will get to the consumer, with the dent in it, and the problem is, you know, people like now won't matter. We won't mind if the dent

in it, or it's got a bit of a chip out of it or it doesn't look perfect, but data says, otherwise,

[00:36:45] **Jen Novakovich:** Now I'm going to go to, because I think on all of these topics, we can spend hours talking about, but I'm just going to, because we're, we're already coming close to the time that you agreed to talk to me.

[00:37:00] So I'm going to get to my Patreon questions, which may take a little while to answer because my Patreon supporters always give the most thoughtful questions. So I will start with a question from Connor who asks, I'd wonder about what, if anything, he wishes people, consumers, or other industry players understood about packaging that he feels they don't. And what part of the process is most difficult? Where do most of the hiccups arise?

[00:37:32] **Dan Coppins:** Very deep question.

[00:37:36] Thank you, Connor. That's a good one. It really varies on let's break this down. So the first part is asking about kind of how much the company has to understand. It depends on company to company. Some are really good at it. Some are really conscious of a fantastic pleasure to work with, and they tend to be the smaller startups, a bit more kind of a younger crowd and a bit more conscious about this, the hardest people that have the expertise in house or the corporate ones, the big, big companies.

[00:38:03] So, you know, you're looking at the, these Unilevers and sort of church and whites and people like this. These are huge, huge corporate companies. They have the expertise in house. I know this because I've worked with something like that, something like that. I know these people, but they're not allowed to necessarily. Do the right thing. And with a corporate things move slower, there's a process for everything and they, it's not, they don't know. They know they need to do it because the consumer the best way, if you want as a consumer, if the best way to get action is to stop buying the products and write them a letter saying now I've stopped buying your products because of this reason, they might start taking a bit more, a note of that all the time, people will make, you know, they're selling product. They're not gonna want to change it because these companies on these big scales have got these machines that are designed to build these very specific products.

[00:38:49] And these machines are multi-million pound machines and they are beautiful to look at if you're in, if you're, if you're interested in engineering christ theres some really beautiful stuff out there, but they're designed to run

these products as quick as possible to get as much out to keep the costs down. If they don't have to change, they won't because it's cost.

[00:39:10] And it's all about the profits. And we live in a corporate world and until people sort of push back on that, it's going to continue this smaller companies. We can make these changes. We can be more agile because I write actually the right moral thing to do is this the bigger companies you, you've got this moral fight where you've got your engineers and your packaging technologists, and you've got your specialist in the house, even, you know, your kind of your consultants, because they're just the same as me.

[00:39:33] I just see they're just not employed by the business. They're all going to be screaming at saying, you must change this. This is what the right thing is to do. This will cut your carbon and big competition say, is it going to affect my bottom line? Of course it is innovation and environmental friendly stuff is quite new.

[00:39:50] And any innovation costs you money, you cannot avoid it. It is a. So you can't change that. That is, you know, these companies will come on board over years, but it is not that simple. What was the second half of the question now I've rambled on so long I've forgotten the bit at the end of it.,

[00:40:03] **Jen Novakovich:** what part of the process is the most difficult and where do the most hiccups arise?

[00:40:09] **Dan Coppins:** I think I've just summed that up though. It's changed. It's it's, it's the money side of it is the biggest and the hiccups come where people try and force something through that. Isn't pretty well thought out, or they try to rush these changes through the reason corporates take times it costs money to make these changes.

[00:40:25] The hiccups do come. When you jump on new technology too quickly, you don't do your research understanding why we're using this material and what that changes. That makes a difference.

[00:40:36] **Jen Novakovich:** Now, another question from Katie who asks, does 100% PCR plastic PP in my case, perform any differently than Virgin plastic when it comes to interaction with the forums.

[00:40:51] **Dan Coppins:** No, but the simple answer is no, it doesn't. Over time, you will get, you know, kind of the polymer change breakdown, but it, again, it

does depend on the, on the routes PCR has taken. If it's a chemical recycling. Absolutely not because it returns it to the oil and makes new plastic from it. If it's mechanical, recycling, potentially it depends on, on that route.

[00:41:11] And I mean, if you're looking at mechanical or a lot of mechanical stuff, isn't food safe because it's got the other bits mixed and stuff. You'll find a lot of the chemical recycling plant, but effectively, no, unless you know, maybe 10 years down the line it might make a difference, but for the initial shouldn't make any difference at all.

[00:41:27] If you're unsure, get yourself a heavy metal test, if you're unsure, make sure you do your sort of stability test. Generally suppliers will give you certification for food safe. Well, they'll be able to advise on, on that, that structural, the polymer that they've used, but generally I wouldn't worry about it.

[00:41:44] **Jen Novakovich:** Now she had a secondary question along these lines. So she is in the process of producing a formula and finding the right packaging for said formula. So she received this email from her cm saying, please note, we do not recommend doing 100% PCR product. 100% PCR is fragile and may have leakage issues. If the formula is then could you clarify that point?

[00:42:15] So it are recycled packaging and not as I suppose, sturdy as Virgin plastic

[00:42:23] **Dan Coppins:** on a technical level. Um, I have yet to see a hundred percent PCR PAC file on leakage. It's not something that I'm familiar with now, if it's a bottle, something like that. No, absolutely. No. That's not going to happen. The polymer chains are still very tight.

[00:42:40] You know, you, everything you need is going to be absolutely fine. The risk is if you're using something like a tube where you've got to heat, seal it, then you may have problems because the sealing is not as effective. Once it's been recycled is just not the case. But if you've got a blow mold, injection, blow mold product, all right.

[00:42:57] And then injection molded product. I don't think that'd be a problem. And I wouldn't be convinced- I would ask them probably to support that point to some evidence because I don't believe that to be the case. I've never seen it. And

I've worked with many of the large suppliers in Europe and, and that's not the case.

[00:43:13] They do a lot of testing before it gets to you. Often. I find that actually, when people are doing it to come up with this sort of thing is because there's an issue getting hold of the material. When you're speaking to suppliers, remember they do know their stuff. They're fantastic, but always pressed the point, ask the right questions and probe because actually sometimes suppliers will take a shortcut and give you something else instead.

[00:43:36] And then, you know, that's their prerogative. They've got business to run, but if you ask a question and you also write questions of what testing has been done, you show a little bit of interest in what they do. They might say, oh, actually we could, we could do it like that. And maybe not. And again, if unsure, get a sample test it, it's very unlikely you're going to get a leak from, from a PCR bottle. It's not for my experience I've ever seen it.

[00:44:00] **Jen Novakovich:** She finished the question with does PCR percentage affect structural integrity? So you've already kind of answered it. So maybe you can give us like a, a definitive answer, but also something that I've heard from other packaging consultants is that there may be an issue with like contamination in the product.

[00:44:20] Obviously, testing testing is, is important to see if this happens, but is this something that's more common as you've been alluding to these answers all along, but is this something that's more, more problematic when we're using recycled packaging?

[00:44:35] **Dan Coppins:** This is where we come down to kind of food contact certification. If it's food contact, your pretty safe uh, is, is a basic line. Cause it goes through all the chemical testing to make sure it isn't generally plastics have chemicals in them when they've been soaked in chemicals for whatever reason. So I bleach bottle turned in something else could have potentially some of these issues.

[00:44:53] It's very, very unlikely. Cause you go through a very comprehensive um, kind of cleaning process some materials better than others you with PET you've got a technique called super-clean, which essentially distills it down several times and melts it and sort of solidifies it and melted again, and removes as lots of these toxins to, to make it better.

[00:45:12] HeP is highly recycled, but not on the same extent to pet and PE, but it still, the, there may be some in that very unlikely. The biggest, the biggest thing I've seen in PCR which you cannot avoid is a color saturation. So you'll either have a yellow or a blue that always be a little hidden for color, and this can be issues for cosmetics and marketing and things, but when it comes to chemicals, not likely.

[00:45:39] Question supplier, ask for certification for tech for kind of chemical testing or for heavy metal testing. Heavy metals are the biggest problems here. We all notice this just plastics all over is you always get a heavy metal test to prove there's not got these things in it. Toxins, again if they are there, they're going to be in such low percentages.

[00:45:56] It shouldn't be an issue, but you can ask for toxicology reports, cost a lot of money, but it's not something. I mean, it depends on the product you put in it. If I'm completely honest, if it's going to be a face cream care, definitely ask the question. It's going to be a shampoo or a shower gel. I'm not going to be so much.

[00:46:12] She can something you're going to put in your mouth hundred percent ask these questions and it has to be food safe. And the regulatory side here there is quite stringent. And I mean, with the kind of sitting with you guys, it's, there are different regulations and things to control this, but the heavy metal testing is universal.

[00:46:29] Something, you know, you can ask your supplier to do whatever you want at the end of. If they say no, then you need to question that, that relationship with that supplier, you know, these are the things. If any self-respect is going to be supportive of your questions, not shoot you down.

[00:46:45] **Jen Novakovich:** And then another question, I have two more questions for my Patreon supporters.

[00:46:48] So this other question is from, I suppose, these are kind of along these lines or what we've already been talking about at least. So this question is from Francesca who asks, how can the packaging companies assess safety of materials used for producing bottles, jars, et cetera, and about sustainability.

[00:47:09] One can hit, this is a long question sorry - cant a refill be considered a sustainable option and two, could it be possible to use biodegradable compostable packaging for cosmetics?

[00:47:24] **Dan Coppins:** Well sure. uh well, lets do washable, then we'll go on to the bar. I mean the bias stuff, I've sort of already put my opinions out on that, but I'm happy to cover that a little bit as well.

[00:47:32] Refills is something that's taking off and if it's on as a full network, it will be a fantastic thing to do a bit with refills. You need to think about what you're going to transport the bulk in. So washing is great. You've got to wash it. And especially pat with bottles and things, make sure you wash thoroughly with soap and you've you've then dried it out thoroughly.

[00:47:51] Because the last thing you want is to get something like Legionnaires in the water, which will a horrible disease will really make a mess of your body. It's about thoroughly cleaning. And this is where we saw the reusable stuff is difficult. When you talk about these companies that go and wash and milk bottles in the seventies or the UK huge thing, but they had to wash these in caustic soda.

[00:48:13] So it's an asset, you know, you you're watching this stuff in chemicals. Where's the chemicals got that's the second part of when we're talking about reusable, fantastic idea, really fully supportive of reusables. It's understanding actually how you make that reusable economics. And environmentally friendly what material you choose.

[00:48:31] It needs to be long lost. There are a whole different host of criteria that you need to meet when you're looking at reusables. And this is why, where I work at the moment. It's just a conversation we're having. And I'm looking into these things and thinking about them, but it's not straightforward. We'll give you a bigger bottle, right?

[00:48:45] Yep. That does work. And actually that's better than the wrong, the bigger, the amount, the more you can squeeze into something and ship to a consumer, the better is if you can then remove the water from that brilliant, because you'll chase even a huge amount of weight, you know, how much weight is in water.

[00:48:59] It's huge, but. Coming back to the point because I'll wander off again. Yes. Reusables are all brilliant. They will be the future. It's just

understanding how we make that a circular economy in itself as well and how we reuse them. Cause you collections, isn't always the most efficient way. Should we drop them off?

[00:49:17] Um, if you look at the UK market, they'd Tesco supermarket are working with Lupe, who was a European supplier and they specialize in reusables, the positive returns scheme Germany. Very good at this. They've got fantastic. Germany is fantastic at most things recycling with anyway, but when you actually look at the reusables brilliant idea, make sure you're checking the LCAs really understanding what materials you're using.

[00:49:41] How long is it going to last? What's the energy that is going to use to clean this and move this around. If that all checks out and it's good go for it. Absolutely. But if you're making a bottle with a pump on it and your replacement is just the bottle, but at the same time, Is that really refillable you'll saving the pump, which isn't recyclable.

[00:50:01] Get that, but are you actually helping? That's the question you've got to ask yourself is, is this better than what I'm doing? Is this actually the answer when we talk about the compulsivity biodegradability, the issue I have with it, apart from the fact that it contaminates the recycle stream. If it's not put in combustibility, if it's not putting the compost.

[00:50:24] So if you put it in your recycling bin, it goes through the recycling .cause the recyclers cant tell if its biodegradable and They won't, they won't be able to check it. If it's put in there to destroy the batch, that's my biggest problem with it. But the second point that they say is how can a biodegradable plastic be good for the environment? When it comes to a primary pack, you've got this carbon you put into this pack, you use your product. Goes in the ground. Single use. Now with theuproar of single use guys, come on, we can't, we can't be doing that biodegradable. Isn't at a point at the moment that the technology is suitable for wide use. I wouldn't say there are certain applications. It works in. If you're selling a product in, in the rural areas of Indonesia or India, biodegradable is a bit more plausible in these areas because they haven't got proper waste outlets that there isn't a recycling scheme there.

[00:51:15] And so there, that's where we needed to consider the compostable and biodegradable materials are a bit more something that we can take seriously. But in the west, in, in first world countries, it's not something I'd recommend because it can do more damage than good to the, to, the, the whole scheme and

the whole circular economy and therefore the environment, because we're not going to re-entry use those materials.

[00:51:37] So it depends, you know, the answer is different depending on the geographic location of your customer. But generally people that are in first world, all designing products for the first world. Third world. Yeah, absolutely. It's something we can consider. I'm not convinced technology's there yet, but we're heading the right direction. There's some fantastic people working on this stuff

[00:51:58] **Jen Novakovich:** in the next question, we may have already answered this, but I'll ask it anyways. This is from Rachel who asks, I was following a conversation about eco-friendly packaging in someone suggested that companies look into packaging, self care products in curtains, because they are lightweight and compostable and leave it to the consumers to decant them into bottles of their choosing off the top of your head head.

[00:52:23] What are the merits and drawbacks to this idea?

[00:52:29] **Dan Coppins:** Uh, I'm not a fan of cartons. Um, I'll tell you what, I'm not a fan of cartons that contain liquids. Because let's be honest. They're not cartons they are multi laminate with a paper outside. So they look like they're made of paper. They're not, they'll have an aluminium layer in there

[00:52:44] there will be a EVOH layer, there'll be about four layers of adhesive in there, then your paper layer on the top. So it's a great idea. But if you're going to go down that route, let's just put everything in a, in a, in a small, very thin plastic bag and send it like that. I mean, it doesn't, it doesn't then you've got the naked issues with the neck, the paper boxes are.

[00:53:06] Big in some parts of the world. but actually if you're looking at I mean milk was a conversation I actually had in the last week about this. So I'm gonna say we should use milk cartons they're so much, but they're complex to recycle. And there are certain companies terrorists with UK, do it when Europe, uh, and the fantastic, I think they're over in Canada, in the us as well.

[00:53:23] I think they've got some steaks over there as well, and they can recycle them, but you need to take them to a specific recycling point and you need to get in the recycling the right way in the materials need to be separated.

The whole point of packaging is easy and convenient. That's one of the big things and convenience can be good as well as bad.

[00:53:40] When we look at a milk bottle. So UK spec milk bottle, if it fits in your fridge door, you've got a thin plastic bottle that can be recycled as in the PE waste stream completely it's mono material. It's very simple. It's nothing. It's not fun. And the thing, any credentials that like, oh my God, that's amazing technology.

[00:54:04] It is amazing technology because it's simple. And the beauty here is in simple stuff. If we start using cartons, you've got all these different layers that when you can't recycle it you've got to try and separate these which uses more energy and more time. And the cartons to me, they don't make any sense from a materials specialist point of view.

[00:54:23] When I look at packaging technology, great technology for the time, really great idea, but in practice, actually, you're, you're mixing all these together. So they become difficult. Simplicity is king, and unfortunately, and this is something I struggled with it in the cosmetics and fragrance market, particularly is simplicity is key and it's fantastic, but simplicity, unfortunately is. You can't make pretty products as easily with one layer materials. You need to decorate it. You need to use labels. If you use a label on a PET bottle that's PET, Hey, it all goes in the same recycling. That's fine. But if you start adding kind of extra kind of layers to this, you want to add a second material,

[00:55:05] it becomes difficult. Pumps the reason pumps can't be recycled, they've got stainless steel and aluminum in them. You've also got rubber gaskets at times, and the way that they work, you've got this piston system with a spring return. They can't be separated. So pumps, they go for incineration kind of most of the time, if they don't go for installation, they gone landfill and that's not good either.

[00:55:26] They can't be recycled. And although these boxes can be recycled, they're very rarely going to be because you're going to have to rely on the all consumer to be conscious enough to take them to the correct recycling points, which aren't always obvious.

[00:55:39] **Jen Novakovich:** I have a few points here, uh, to my understanding, there's been some innovation because this is a giant challenge for, it's hard to recycle mixed materials, to figure out a way to make everything.

[00:55:51] It's hard to make it look nice. As you've mentioned single material. And then there's been as far as I understand, but I could be ignorant, but innovation for producing single material pumps. I don't know where we're at on that front. So that's 1, piece there, but then also, um, I also wanted to bring up, well, firstly, for the, like, why wouldn't we just put it in a plastic bag?

[00:56:16] Because consumers don't like plastic bags, the, the nation has been convinced that plastic equals bad because. It's easier rather than actually educating people. And also, like, I wouldn't say this is like a, this is a general theme instead of addressing the larger issues, we focus on like easy solutions that look good. There's that point. But then I also wanted to bring up. I'm not sure it just recently happened. I'm not sure if you saw this, we do have Terra cycle in north America. Were they from. I think they were in from north America.

[00:56:52] **Dan Coppins:** I think, I, I think that, I think they're us based

[00:56:55] **Jen Novakovich:** but I don't know if you saw this, this just happened. This just happened that a Terra cycle is currently being investigated for the recycling claims where they didn't actually substantiate it. So yeah. Currently there is a lawsuit against them. So you may not have seen

[00:57:14] **Dan Coppins:** yeah, very few people agreeing to in ingredient, you know, when you're talking about network, size of terra cycle, there's going to be some, you know, some issues in there.

[00:57:22] No, no system is infallible. And I think the point that you made there, that that is the highlights. You made two points that I thought I'd let you, I'll let you finish. And then I'll pick up on afterwards. What politicians are doing is virtue signaling. So that they're looking like they're doing the right thing to get the votes

[00:57:37] **Jen Novakovich:** yes.

[00:57:37] **Dan Coppins:** A virtue signaling is a big issue. That's global doesn't matter where you are virtue signalings huge. And when you see, look at the plastic bans in the EU, because we've got the EU European union government, central government, and they banned a lot of plastic single use and they've changed food, but it's the source of the information they're getting is the wrong sources.

[00:57:55] Um, which leads me onto the second issue where that source comes from. Now. There's a push against plastic and I, and our prime minister, Boris Johnson recently said, recycling doesn't work. And it's like, it got taken. So out of context, and he's only been given a nugget of truth. I saw recently, obviously we had the cop 26 in, in Glasgow, Scotland.

[00:58:14] And some of the people I saw that are gone, you just look and you go, why are they there to advise?

[00:58:20] **Jen Novakovich:** Yeah,

[00:58:20] **Dan Coppins:** they're not technical people. They're not scientists. These are people that are very anti plastic, very openly anti plastic, but very against sharing their sources or their, their scientific support. But these are the people that getting ask to support the government.

[00:58:33] People that don't really know what they're saying, but they're very, very influential. They're very flamboyant people. They're nice to listen to that interesting to listen to. And they're very passionate about that side of it, but what they don't do, they refuse to listen to the opinions of the other side or all the scientific facts in many cases.

[00:58:51] And it becomes a very difficult battle. And I don't like it being a battle. I'd much rather like you sit down and have the conversation like this is my opinion, this is my experience. From working in several sectors, I've worked pharmaceuticals, food, cosmetics, fragrance, you know, I've worked across a lot of industries and I've seen the same sort of issues across all of them.

[00:59:11] There are technologies. We don't utilize for food that actually, if we bought cosmetics Christ and blow your mind and what we could do with it, you know, moving across industries and sharing information is something the scientific community isn't very good at. We don't share. And we don't put it out there because everything has got a financial value pointed against it comes back to your corporate world situation or is he making money there?

[00:59:32] We need to be better at sharing and we need to be better. Listening. Listening is one of the most important things and I'm bad for it as well. I told you, I ramble as you've found down off, I ramble a lot and I go off on tangents and I, sometimes I forget this and you know what? Stopping and listing really puts a new perspective on it.

[00:59:50] And I'm not saying this is what I believe, and they've never change. If someone can come to me and say, actually this material better plastic, here's one, here's the supporting information. Christ I'll support that I'll buy that

[01:00:01] **Jen Novakovich:** as any good scientist should change their opinion presented with better.

[01:00:05] **Dan Coppins:** You've got to be open to- yeah

[01:00:10] **Jen Novakovich:** So let's all keep an open mind going into this new year. If you feel we missed or skipped over your favorite packaging material, come add your voice to our discord server. If skincare and cosmetics at large as your jam, it's seriously worth setting up an account. Get direct access to industry talks, live podcast recordings, and we are hoping to make it the best community to get your skincare questions answered.

[01:00:38] It's free to join. You just need a discord account. Huge. Thanks to our patron supporters. You guys keep the show on the air. If you're looking for a way to support the channel, check us out over at [Patreon.com/theecowell](https://www.patreon.com/theecowell) big shout out to Maya, Sarah, and JGP for supporting us at the full spa treatment tier you guys are amazing. Huge thanks to Dan for his time on the show today. And thank you for tuning in.