

NATHAN: Yo. My name is Nathan. Today I'm going to talk to you about food preservation.

So everyone has food. We eat it. Got to survive, and you can't eat it forever. It's going to go bad. And so I've got these two examples. I got this nice orange, pretty vibrant, but it's a bit squishy. I don't think I'd want to eat it. I've also got these crackers. They were left out for a couple weeks, but I don't know. They're still pretty crunchy. And I think I'd eat them. In fact, I did.

So what exactly is it that causes food to go bad? And the answer to that is usually fungus and bacteria. So first off, let's think about what we're up against. Where are fungus and bacteria? And the answer is everywhere. So when we're talking about fungus and bacteria, they can enter the food's system at pretty much any point along the way.

You know, when you have a nice animal sitting along munching its grass, it can get in at that point. And they'll be carried along to the meat if you're eating meat. It can get on when you're processing food, when it's on a con-- you know, in large factory group settings. And of course, when you're preparing food or eating it, it's going to get off your grubby, little hands.

So that's what it is. How does it survive? What does it need? And that's going to be same as us. It just needs food, water, and oxygen. Pretty simple, so how do you deal with that? There's no sort of like special thing to survive that you can easily take advantage of.

Well, there's two basic ideas. First, you want to slow down and then try to stop its beh-- you know, its activity. And the second is you want to kill the fungus or bacteria. And there's a number of ways to do these.

So you can refrigerate and freeze an item. It slows down activity. You generally want to keep it in the fridge about-- just like a smudge around like 35 degrees Fahrenheit. And if you-- or in the freezer, you want it just below freezing. You can dehydrate or freeze dry something, and that does a pretty good job of inhibiting activity.

You can salt something, which can, in fact, both kill and inhibit activity. You can pickle something. You can pasteurize it. You can can it. You can radiate it, which works fantastically. But people don't like nuclear stuff. You can ferment it. You can carbonate it. But by and large, in American society, we like chemicals. So most of the food you're going to eat isn't, like fresh produce, is going to, in fact, have chemical preserves, preservation in it.

So what are the-- there is three main ways to do this. You can have an antimicrobial approach. You can have an antioxidant. And you can working its enzymes.

The first one is pretty simple. You're just going to try to kill the small microbes, the bacteria, the fungus. The second one, you're going to, as the name would imply, antioxidant. You're basically going to try to prevent these things from breaking down fats and lipids by having a reducing agent. And last thing is when you're talking about going against enzymes is basically in some things like food in particular, when an item is ripe, these different enzymes start coming up, like an ascorbic acid in apples, and basically what you try to do is counteract these.

So within things that perform these functions is four main things that use-- get used a lot. First, you have sulfides, which do everything perfectly, or pretty well. But unfortunately, some people are allergic, so you don't see it in everything. Most commonly you're going to see them in dried fruit , kind of potatoes, starchy things.

You also have propionates, which tend to be more for like things like bread. Or they also feed it to a lot of animals. So to kill-- prevent them from getting infections and all these things. And what that mainly does is kills bacteria and especially fungus and can keep things like bread more fresh.

You have benzoates, which are mainly for-- which basically just kill the fungi or bacteria. But they tend to work at a lower pH, so when it's acidic. And so often you'll see those in things like fruit juices or carbonated beverages or sparkling things or-- and vinegar-based solutions. So that's where you see that.

The last one, which is getting to the meat of the topic, are nitrates and nitrites. And mainly you see those as antimicrobials and as antioxidants. And you will see them in hams, cured items. You know, if you're getting any sort of frozen meat, that's going to have nitrates, which are wonderful except when they react with amino acid. They can possibly sometimes lead to cancer. They have some carcinogenic links.

But those are the main ways that you're going to be able to have a nice, fresh cracker versus a squishy old orange that had nothing done to it. If you're interested, the crackers have in them something that's called sodium bisulfite, and it makes it nice and tasty.