Why Ordering a Cocktail with “Light Ice” Is a Terrible Decision

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“LIGHT ICE” DOES NOT MEAN MORE ALCOHOL

Alright, everybody. Buckle up. I have always wanted to say my two cents on this, and now my time has come. I apologize in advance.

Whenever a customer orders a cocktail with “less ice” or “light ice,” I always want to sit them down, over a cocktail of course, and explain all of this to them. But obviously, management doesn’t allow me to just leave the bar and sit down with a customer in the middle of a rush and drink on the job. The nerve.

However! Now I have the time. So please, grab yourself an Old Fashioned or your other favorite cocktail and join me.

Let us begin.

There seems to be a misconception out there in the world that bars put more ice in a cocktail so they can use less booze and basically cheat you out of getting your money’s worth. I’m not saying those bars don’t exist; I’m just saying I have never seen one or been to one. Any business operating with a shred of integrity isn’t going to do that.

As the bartender, I want you to be happy! After all, I’m working for tips (but I do want you to be happy regardless). The restaurant or bar doesn’t pay us much money; in some states it’s as low as $2.13 an hour. We work for you. Why would we cheat a customer to help the establishment that isn’t really paying our rent? It doesn’t make any sense. The customer is the one who pays our rent. We’re there for you! (I mean, we are grateful to the establishment as well. I’m just saying the logic isn’t there.)

When a customer orders less ice, they are going to get the exact same cocktail, with the exact same amount of booze, just with less ice. The glass isn’t going to be more full. It will be half empty.

This is the other misconception: that if the bartender uses less ice, then magically one will get more alcohol, because the bartender will want the glass to be full. Let’s just pause a second here…

What about bartenders using less ice makes one think they’re going to compensate by adding ounces of more booze?

Cocktails are a science. Everything we do when making a cocktail is about proper balance between all the ingredients. If someone just wants to get wasted, they should order a shot (or several). Adding another two ounces of tequila to a margarita isn’t going to taste good, so bartenders aren’t going to do that.

Also, light ice is actually going to cause the cocktail to be more watered down than it would be if it were full of ice. Which leads me to my next point.

Ice is so important in the process of making a cocktail. You cannot make a cocktail without ice. You cannot make a cocktail without dilution, and you cannot dilute a cocktail without ice. As bartenders,

WE LOVE ICE.

In fact, we obsess over it. Seriously… we do.

Understanding ice and how it interacts with alcohol in the shaker or in the mixing glass is essential to creating a good cocktail. Not to mention that ice, especially clear, cut ice, is just sexy af.

If you want a drink with no ice, order your cocktail “up.” As in, “Can I have a Don Julio Margarita up, please?” This way we can chill your drink to the proper temperature and dilute it to the amount that is necessary for that particular cocktail to be served without ice.

Alright, everyone. Things are about to get real nerdy. I'm going to explain why ice is so important, how it interacts with the cocktail, and why ordering a cocktail with "light ice" is just… not the smartest move. If you don't want to go there, I don't blame you. Feel free to skip to the very last section. But before you go:

Just remember: asking for light ice isn't going to get you more booze, and take my word for it, you want the amount of ice we give you.

Alright, fellow nerds. Here. We. Go.

A POTENTIALLY WAY-TOO-DETAILED DIVE INTO THE THERMODYNAMICS OF ICE

Have you ever wondered why your drink is so cold? I mean, probably not. But let's think about it. Ice is only 32 degrees F, so how can your cocktail be colder than that? It must have been made with ice colder than 32 degrees, right?

NOPE.

To understand how this works, we must look at the thermodynamic properties of ice (only at the surface level, let's be real). I'll explain this the way I learned it, from a favorite book of many bartenders, Liquid Intelligence by Dave Arnold. If you love this nerdy section, you'll love that book. It has 20 pages dedicated to ice, and it's glorious. It is definitely not a beginner cocktail book full of fun recipes, though; only get it if you're super into the science of cocktails. But I digress. So!

Ice is in a constant tug of war between wanting to freeze and wanting to melt.

We call these two properties enthalpy and entropy. Enthalpy is always fighting to freeze the ice, and entropy is working to melt it.

How does one get ice to melt? We apply heat! But applying heat doesn't change the temperature of the ice. The ice is going to stay at 32 degrees F until it's completely melted.

Ice does not melt below 32 degrees. It will not start melting until it reaches 32 degrees, and it will stay at 32 degrees until it's no longer in a solid state.

Even though we are adding heat, which is a form of energy, this energy breaks the water molecules free from their icy crystals back to their liquid form. It's these molecules we need to pay attention to.

Temperature is a measurement of the average speed of molecules within any substance.

That's all temperature is: the average speed of molecules. It's very different from heat.

Ready for it to just get crazy?

When water freezes, it actually gives off heat.

This heat, when it occurs in your freezer, is absorbed due to the way freezers work, but it's certainly producing heat. Because ice gives off heat, the internal energy of ice is lower than the internal energy of water at the same temperature. To quote Dave Arnold:

> *It is super-important to remember that point: freezing water gives off heat. Melting ice absorbs energy; it requires heat to melt.*

Nature, like a lot of us, is lazy. Because of this, reactions that give off heat and result in a lower internal energy are normally favored. The lazy way is to be in the most natural, lowest-energy state. So, because of this desire to be in the lowest-energy state, and because making ice gives off heat while melting ice absorbs energy, the change in heat favors water turning to ice. This is enthalpy.

Still with me? Isn't this crazy fascinating!?

The science continues!

Now that we understand what is causing the water to freeze, we must look at what is causing the ice to melt. This is where we learn about entropy.

Entropy in thermodynamics is often referred to as the degree of disorder in a system. So when entropy increases, so does disorder.

Molecules that are ordered are not entropy. Disordered molecules are entropy, or I should say the measurement of how many disordered molecules there are is entropy.

So nature is lazy, right? But nature also wants to be free. Free in the sense that molecules want to take up as much room as possible. Trying to be free increases entropy; they want to occupy all the space they can in any given substance. The more space available, the more room there is for disorder.

Let's think of this in terms of the global pandemic.

We humans want to be free to roam wherever we want. We want to go to the local bar and see friends, we want to go to the movies, we want to go for a run in Central Park with our favorite running group. Basically, we want to do what we want when we want. But the pandemic changed all that.

We can no longer leave our houses. We're stuck home with nowhere to go. Do we enjoy this? NO! We want to be free again to roam around and see who we please and be where we please. So we're constantly fighting to go back to our normal, free state so that life can resume the way we like it most.

Well, water molecules don't like quarantine either. They love to be free! There are more options of speeds and positions available to the molecules in liquid form than there are in solid form. In liquid form, water molecules can spin, find partners, learn how to tango at their local YMCA, etc. Water molecules want to be liquid for the freedom to occupy more space.

Water molecules in a solid state, however, have strict shelter-in-place mandates from their government of physics. They are locked in place by ice crystals, with little to no room to wander. Like us, they are constantly fighting to be free again. For them, freedom means a liquid state. Their solid state is too constraining, so changes in entropy favor ice melting.

OK. So... what does this have to do with my cocktail?

So which property in our tug of war wins when we make cocktails, and why does it matter?

Well, this depends on the temperature (which, as we learned, is just the average speed of the molecules in a substance). The higher the temperature, the faster the molecules are moving. The faster the molecules can move, the more disorder they can cause.

A higher temperature means that entropy will probably win the tug of war, and that ice of yours is going to melt. But as the temperature goes down, the molecules slow down, the energy released from the freezing process is favored, and the water continues to freeze.

There is only one temperature at which ice lives a peaceful life and gets a break from the constant tug of war: 32 degrees F. At this temperature everything is in perfect balance, and it breathes a sigh of relief and tries to squeeze in some meditation before the temperature inevitably changes. Namaste.

The outside surface of the ice is a very different story, even at 32 degrees F.

The surface of the ice cube is constantly changing. The water molecules on the surface are in a constant state of melting onto its own surface and refreezing. If more water molecules are attaching to the ice, we would say it's freezing. If more water molecules are leaving the surface of the ice, we would say it's melting.

Even at 32 degrees, that process is still happening. It's just melting and freezing at the exact same rate.

Everything comes down to temperature. At lower temperatures, entropy doesn't really stand a chance, and the little gain it can get is negated by the power of enthalpy. The higher the temperature gets, the more entropy goes full Hulk, and the more helpless enthalpy is to fight against it.

Now our cocktail comes back into play.

This was all to explain how we can make a cocktail colder than ice itself.

Hang in there, because shit's about to get real.

Let's make a Negroni, which is a stirred cocktail. We place the alcohol in the glass and then place our ice in the glass as well. Then we start to stir.

Quick sidebar: what is interesting is that ice is not going to melt until it reaches 32 degrees. If you put ice into the glass straight from the freezer, where the surface of the ice is colder than 32 degrees, you are going to find yourself stirring or shaking longer, because you have to get the ice to warm up before it will actually melt. It doesn't really matter; it's just interesting.

So now we've been stirring, and our Negroni has reached 32 degrees, and our ice is also 32 degrees. Everything in the mixing glass is 32 degrees. Now what? Well, this is where enthalpy meets its end.

When the ice molecules melt, what do they do? Remember? They absorb heat. So when the ice melts in your cocktail, it's absorbing heat. The amount of heat it's absorbing is actually the same amount of heat it would absorb if it were just melting into water.

Whether it's water or alcohol (ethanol), enthalpy reacts the same. The amount of heat absorbed from the melting hasn't really changed from putting ice into alcohol, because the ice is just… pure ice. The enthalpy will be the same, because enthalpy is reacting to itself.

Stay with me!

HOWEVER.

The entropy change when water molecules melt into alcohol is very different from icy water molecules melting into a glass of water.

Said another way, entropy is different when icy crystals react with ethanol than when they react with liquid water.

When our water molecules melt into the gin mixture, the entropy gain is much greater; there is so much more freedom in the ethanol/water mixture than there is in the water/water mixture. It's like starting quarantine in rural Nebraska and then having it end in New York City.

Water and ethanol are more disorganized and disrupted than water in water. The more disorder, the more spaces to occupy! Entropy starts kicking butt and taking names. It's winning. And when entropy wins, what happens? Ice starts to melt. When ice melts, what happens? Cooling starts.

Because the melting ice absorbs heat, it begins to chill our cocktail. Entropy starts to increase because the ice is melting, but there isn't an external heat source to supply the heat needed to melt the ice and create the greater disorder it seeks.

Remember, our cocktail is already at 32 degrees, so everything in the mixing glass is already chilled. There is no additional heat source. So the heat is drawn from the system itself, and in turn chills the entire system. Ready for this?

The drink AND the ice begin to chill below 32 degrees F.

Entropy continues to increase and increase, making it seem as if entropy will win the tug of war. But wait. There's more!

As our gin becomes more diluted, entropy's gain over the heat loss from the melting begins to decrease.

Our cocktail and ice are now below 32 degrees, and entropy's gain continues to slow until a new equilibrium is reached.

The entropy and heat become balanced again. But now, that balance point is the new freezing temperature of the Negroni. BELOW 32 DEGREES!

Sidebar fun fact: this is the exact same principle behind how ice cream is made by adding salt to ice. Salt doesn't just "lower the freezing temperature of ice." It causes this fight between entropy and enthalpy, and because of that it creates a new equilibrium between the two forces below freezing, which allows the ice cream to freeze. #Science

WHY ICE MATTERS

There is nothing that will chill a drink faster than melting ice.

Those whiskey rocks in your freezer? NOPE. That blue gel bag you have in your freezer, dropped in a cocktail? NOPE. Melting ice, and the entropy gain associated with it, is what causes the cocktail to get below 32 degrees. Those other options may eventually chill the cocktail down to 32 degrees, but never below. You need the melting ice water to interact with the alcohol (ethanol) to do that.

See. ICE IS AMAZING!

Now you may be asking: yeah, but I don't want my cocktail watered down.

Melted ice (dilution) is just as important in a cocktail as the base spirit is.

You cannot have a chilled cocktail without dilution, and you cannot get dilution without chilling the cocktail. Bartenders create cocktails with dilution in mind. Dilution could be an entire separate blog post, with a deep dive into the appropriate amounts for any particular cocktail. But just as an overgeneralized rule of thumb, about an ounce of dilution is what you should shoot for.

OK. But what's the point of shaking and stirring if we just need the ice?

To be the most effective in chilling a cocktail, we need to know where the ice melts, which is at its surfaces. If we can increase the surface area, we can increase the melting area and increase the rate at which the ice melts. But it's not just the surface area that matters. If we only throw a block of ice in a shaking tin or mixing glass and do nothing else, it's not going to melt very fast or cool the cocktail very fast.

When we shake or stir a cocktail, we're making it possible for fresh alcohol to always be coming into contact with the many surfaces of the ice.

If we only throw in the ice cube and do nothing else, the only alcohol that would come into contact with the ice is the tiny amount resting at its surfaces. So we shake or stir. What this does is increase the surface area even more and increase the rate at which the cocktail chills.

The faster we stir or shake, the faster the cocktail gets cold.

We also want to increase the rate at which the melted surface water leaves the ice cubes, another reason for shaking or stirring. To quote our friend Dave Arnold again:

> *The fast mixing of cold ice meltwater with the alcohol is the fastest and most effective way to chill a cocktail.*

Even liquid-nitrogen-chilled objects cannot chill a cocktail as fast as melting ice can.

ISN'T ICE CRAZY COOL?!?

ALL THIS TO SAY

(Readers skipping the nerd-out section: jump in here.)

All of this is why we take ice seriously. We know what we're doing when it comes to ice, as it's an integral part of making a cocktail.

Remember, when you ask for "light ice," the physics is working against you.

The more ice you have in a glass, the more surface area there is, and the colder your drink will stay. Light ice doesn't have enough surface area to properly keep your drink chilled; the ice is actually going to melt faster and make your cocktail too diluted (watered down). It's just a terrible way to enjoy a cocktail.

Trust us, we're always looking out for you. We want you to have the best cocktail experience possible. And light ice just ain't it.