

FTIR spectroscopy

## Creating the perfect sip

In this Q&A article, Sarah Heald, Quality Supervisor at Coca-Cola® discusses how the Thermo Scientific™ MAX-Bev™ System plays a crucial role in their CO<sub>2</sub> monitoring processes.

### Can you introduce yourself and describe your role at Coca-Cola?

My name is Sarah Heald, and I am the quality supervisor at Coca-Cola Beverages Northeast, in the Londonderry Production Center near Manchester, NH. I work with a talented and diverse team of lab technicians and syrup batchers who carry out extensive testing on raw materials and finished products.

“My role is to create *the perfect sip*, to deliver the best experience for the consumer, and we rely on the Thermo Scientific MAX-Bev System to help us do that.”

Sarah Heald  
Coca-Cola Beverages Northeast

We test everything from raw materials to the finished products that you would see on the shelf. My role is to create “the perfect sip,” to deliver the best experience for the consumer, and we rely on the Thermo Scientific MAX-Bev System to help us do that.



Sarah Heald  
Quality Supervisor  
Coca-Cola Beverages Northeast

### How does ensuring CO<sub>2</sub> purity affect the quality and taste of Coca-Cola's products?

If we accept a CO<sub>2</sub> delivery that contains the wrong grade, the issue may not be apparent until the product is on the shelf, and we might not know about it until the consumer complains.

This is very frustrating for me as a quality supervisor because it could have been easily prevented by using an inline analyzer and conducting a test as simple as pressing “start,” as the MAX-Bev System does. These complaints are some of the easiest to prevent, especially when they pertain to something as manageable as unpleasant odors and tastes.

### **How important is it that the CO<sub>2</sub> purity monitoring process is accurate and precise?**

There are different grades of purity of CO<sub>2</sub>. Beverage-grade purity must be 99.9% pure which is why we require very precise and accurate testing of the CO<sub>2</sub> to ensure we are receiving this level of purity.

We use a parts-per-million scale to measure the level for some impurities, whereas for other impurities, we have to go down to parts per billion. Hence, we are measuring on an extremely small scale.

This level of purity is extremely sensitive to measurement, which is why we rely on the MAX-Bev System to provide the required accuracy. If we are unable to detect the impurities from the truck at the point of origin, the finished product may have an off-odor or smell.

### **What are some challenges you face when it comes to maintaining the purity of CO<sub>2</sub> during transport, storage, and shipping?**

Keeping our supply steady during COVID-19 was a huge challenge for us. With the requirement for beverage-grade CO<sub>2</sub>, we had to ensure that we had approved suppliers. When you do not have an established relationship with certain suppliers, it is very difficult to guarantee 99.9 % purity.

This is where we rely on the MAX-Bev technology and our relationship with Thermo Fisher Scientific to produce reliable results, ensuring that we are getting 99.9 % purity when we have to use outside suppliers.

In addition, we are required to accept first deliveries due to the risk of contamination. If the first delivery is not received, this is where the storage issue comes in. The supply is similar to a car; if you do not have the right fuel grade, your car does not run the same. If you do not have the correct purity of CO<sub>2</sub>, drinking a classic Coke® will not provide the same experience. Certain people can tell the difference, so we need to make sure that the level of purity is beverage grade.

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### **How does the MAX-Bev System help you meet industry CO<sub>2</sub> purity standards, such as those set by the ISBT?**

The ISBT's industry standards for beverage-grade CO<sub>2</sub> are identical to those set by Coca-Cola, meaning there is no difference between them. At our facility, the MAX-Bev System ensures that every CO<sub>2</sub> delivery we accept is 99.9 % pure, fully meeting these industry standards.

### **Can you walk us through the quality control process for monitoring CO<sub>2</sub> purity at Coca-Cola, including the use of the MAX-Bev System?**

When a CO<sub>2</sub> delivery arrives, a lab tech will greet the driver at the CO<sub>2</sub> tanks. After verifying all the seals on the truck match the paperwork, the driver connects the hoses. A sample from the truck is taken through the analyzer to ensure that the purity matches the supplier's certificate of analysis. What is great about the MAX-Bev System, everything is timed and automated, so there are no further actions for the tech at this stage. The results are displayed on the screen as a simple pass or fail for all of the attributes that Coca-Cola requires for their beverage products.

### **What happens when the tanker arrives and the gas is delivered, how frequently the test is run, and how many times a tank must be tested?**

When a truck arrives, the driver will hook up and place the hose in bypass mode. As a result, a small portion of the truckload will be placed in the analyzer rather than the tank. So, we can be certain that what is in the truck is 99.9 % pure beverage-grade CO<sub>2</sub>.

It will do three rounds of testing. Each test is about three minutes long. This will ensure that all of the attributes assigned to us by Coca-Cola, for making sure that all the impurities are below a certain level, are met before we accept the delivery.

### **What are the benefits of the MAX-Bev System? How does it compare to the traditional methods?**

The previous system also used an analyzer, but we had to return to the building to get the results and then go back out to the truck to inform the driver that the test had passed.

Before this system, all of the testing was done manually. The lab tech would get a sample of CO<sub>2</sub> from the truck, bring it back to the lab, and conduct a series of tests involving dangerous chemicals and glassware that could take up to 30 minutes to complete.

If a mistake was made, they would have to start over from the beginning, which could take up to an hour.

The MAX-Bev analyzer has eliminated a significant amount of human error that can occur during testing. In addition, the time saved has also significantly improved the process.

**Can you discuss the technical capabilities of the system in terms of measuring trace impurities and why these features are important for quality control?**

As the purity of beverage-grade CO<sub>2</sub> is so high, the analyzer must be able to detect impurities at an extremely low level. This is why the FTIR technology must be very accurate. For instance, aromatic hydrocarbons are very important to look at when testing the CO<sub>2</sub> from the truck. The maximum acceptable level is 0.02 parts per million.

The MAX-Bev System can detect aromatic hydrocarbons at this level without issue. This is another reason why I am so confident in this analyzer.

**Could you comment on how you use MAX-Bev System to retrieve results?**

The analyzer features an excellent user interface with screens on both the inside and outside, making it easy to immediately determine if the results are passing or failing.

Additionally, results can be retrieved directly from the database via USB, allowing for easy printing from a PDF file. The system also includes onboard storage for results on the computer integrated into the analyzer, and these reports can also be printed externally.

**How long does the process take now compared to the old system?**

It now takes about 15 minutes between when the driver calls the lab and when the lab tech returns from a completed test. The lab tech meets the truck driver outside. Once the truck driver has connected his hoses from the truck to the MAX-Bev System and our external CO<sub>2</sub> tanks, a small amount of the CO<sub>2</sub> in his tanker will be diverted into the MAX-Bev to be analyzed for impurities. The test will take about a total of nine minutes.

Previously, the testing procedure took much longer. It could take anywhere from 30 minutes to an hour to collect a CO<sub>2</sub> sample from the truck and transport it to the lab.

**Can you discuss the reliability of the system, as well as the support you receive from Thermo Fisher Scientific?**

The system is extremely reliable. We have also established a strong relationship with the technical representatives from Thermo Fisher Scientific. They conduct regular health checks on the system, either in person or remotely. They can log in to the system at any time to conduct checks. They then send

us detailed reports via email. They can also come on-site with little notice. We have previously scheduled services, and they usually arrive within the week.

Having said that, we do not need to use these services much because the system is already very reliable. It is very self-explanatory; there are almost no errors that we cannot figure out on our own. From a technical standpoint, it is very easy to use. My lab techs prefer this system to our old system, even though it had a similar interface. Since implementing the MAX-Bev System, I have noticed a significant decrease in the stress level associated with receiving a CO<sub>2</sub> truck.



**What did you do prior to implementing the MAX-Bev System, and how has the product changed the entire process?**

Before implementing the MAX-Bev System, we lacked a continuous monitoring system. This meant that more testing of CO<sub>2</sub> was required at the time of delivery. A lab tech could sometimes be occupied with receiving the truck for up to an hour, with any mistake causing repeat testing. With this type of system, we have been able to simplify our processes, saving time and easing stress on the lab techs, drivers, and other plant personnel as well. The MAX-Bev System has been a huge improvement to our CO<sub>2</sub> receiving process overall.

