

Guest Author: Ramkumar Dhandapani, PhD. Global Product Manager for Gas Chromatography

Since COVID-19 has become a global pandemic, there have been several guidelines published by organizations such as Centers for Disease Control and Prevention and the World Health Organization on personal hygiene including, hand washing and hand sanitization. This in turn has increased the demand for alcohol based sanitizers being tested by personal care product manufacturers. While this blog is written in intent to help alcohol based hand sanitizer manufacturers expedite their testing laboratories, it is not intended to address shortages of alcohol-based hand sanitizers associated with the COVID-19 pandemic.

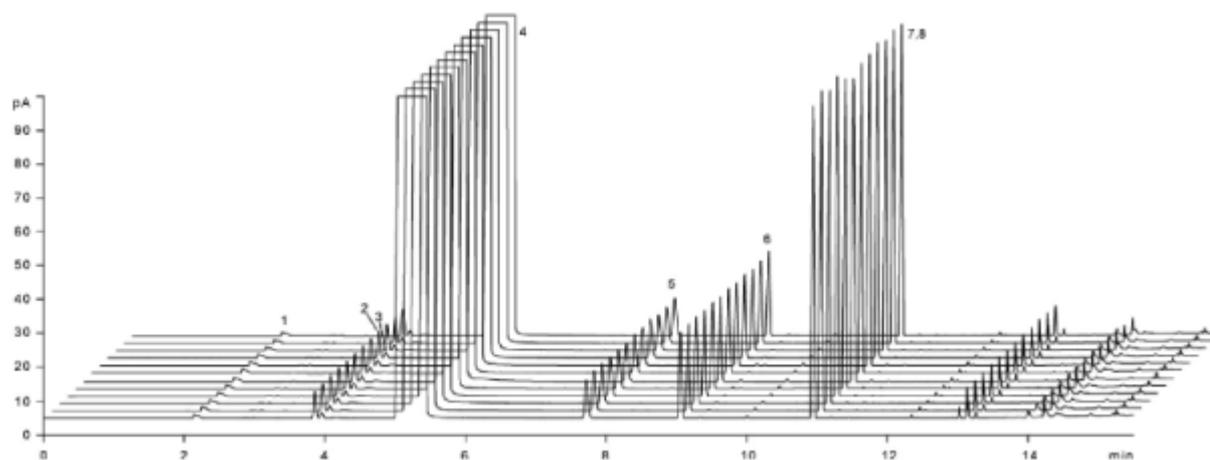
Hand sanitizer or the alcohol based rub are consumer products in the form of liquid or gel and are thought to generally be effective at killing microorganisms and decreasing infectious agents on our hands. While there are a variety of hand sanitizers available, they can be classified into two major groups: non-alcohol and alcohol-based sanitizers. While non-alcohol based sanitizers may contain surfactants like benzalkonium chloride or antimicrobial agent like triclosan, alcohol-based versions typically contain some combination of isopropyl alcohol, ethanol (ethyl alcohol), and/or n-propanol. The alcohol-based sanitizers are typically the most popular and the versions that contain 60 to 95% alcohol are most effective. Some versions of alcohol based sanitizers contain compounds such as Glycerine/glycerol (a trihydric alcohol) as a moisturizing component to prevent drying of the skin.

Since the major components of alcohol-based hand sanitizers includes lower alcohols like

methanol, ethanol, n-propanol and iso-propanol that are quite volatile, the prime testing method is performed using gas chromatography (GC). In GC, the volatile compounds of interest are primarily separated based on boiling point and GC columns with polar selectivity provide additional intermolecular interaction like dipole interaction to separate individual components based on polarity. A quick look at the analyte shows that the compounds of interest here has hydroxyl -OH group (alcohol group).

Like-dissolves-like is the principle of gas chromatography and hence a polar column selectivity like Zebron™ ZB-WAXplus is an excellent choice to separate the alcohols of interest far from each other. ZB-WAXplus is a Polyethyleneglycol based GC column with a polarity number of 52. This GC stationary phase, unlike traditional PEG phase can handle 100% aqueous sample in addition to providing polar selectivity. As represented in **Figure 1 (App:15817)**, alcohol compounds including methanol, ethanol, propanol and butanol are separated within 15 minutes from the aqueous matrix. In addition to the separation, injection to injection reproducibility can be noticed for this challenging aqueous matrix. This high throughput separation example employed sample with a high percentage ethanol to mimic alcohol based sanitizer. A run time of less than 15 minutes is extremely helpful for faster testing and expedited batch release based on the GC test results.

Figure1: Separation of Alcohols in aqueous matrix on a Zebron ZB-WAXplus GC column



GC Parameters:

Column: Zebron ZB-WAXplus

Phase: 100% Aqueous Stable Polyethylene Glycol (PEG)

Dimensions: 30 meters x 0.25 mm x 0.25 μ m

Part No: 7HG-G013-11

Injection: Split 30:1 0.2 μ L @ 140 °C

Oven Profile: 35°C for 5 min to 85°C at 10°C/min to 200°C at 25°C/min for 1 min

Carrier Gas: Constant Flow Helium, 1.4 mL/min

Detection: Flame Ionization (FID) (200 °C)

ANALYTES:

1 Acetaldehyde

2 Ethyl acetate

3 Methanol

4 Ethanol

5 Propanol

6 Isobutanol

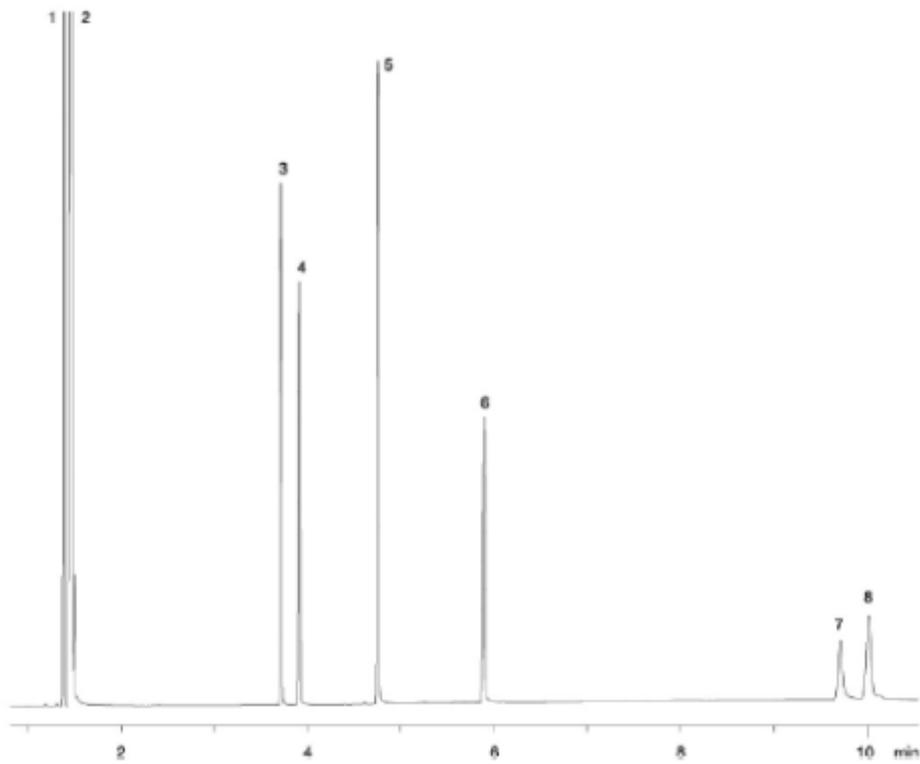
7 2-Methylbutanol

8 3-Methylbutanol

In addition to lower alcohols, trihydric alcohols such as glycerols are added as moisturizer in hand sanitizers. **Figure 2** (App: 16510) shows the separation of some of the common glycol and glycerols that are added to sanitizers. Here as well, a run time as short as 10

minutes helps provide high-throughput separation.

Figure2: Separation of Glycerol on Zebron ZB-WAXplus GC column.



GC Parameters

Column: Zebron ZB-WAXplus

Phase: 100% Aqueous Stable Polyethylene Glycol (PEG)

Part No: 7HG-G013-11

Dimensions: 30 meters x 0.25 mm x 0.25 µm

Injection: Split 20:1 0.5 µL @ 225 °C

Oven Profile: 80 °C to 180 °C @ 20 °C/min for 20 min.

Carrier Gas: Constant Flow Helium, 3 mL/min

Detection: Flame Ionization (FID) (250 °C)

ANALYTES:

1 Benzene

2 Acetonitrile

3 1,2-Propanediol

4 Ethylene glycol

5 1,3-Propanediol (internal standard)

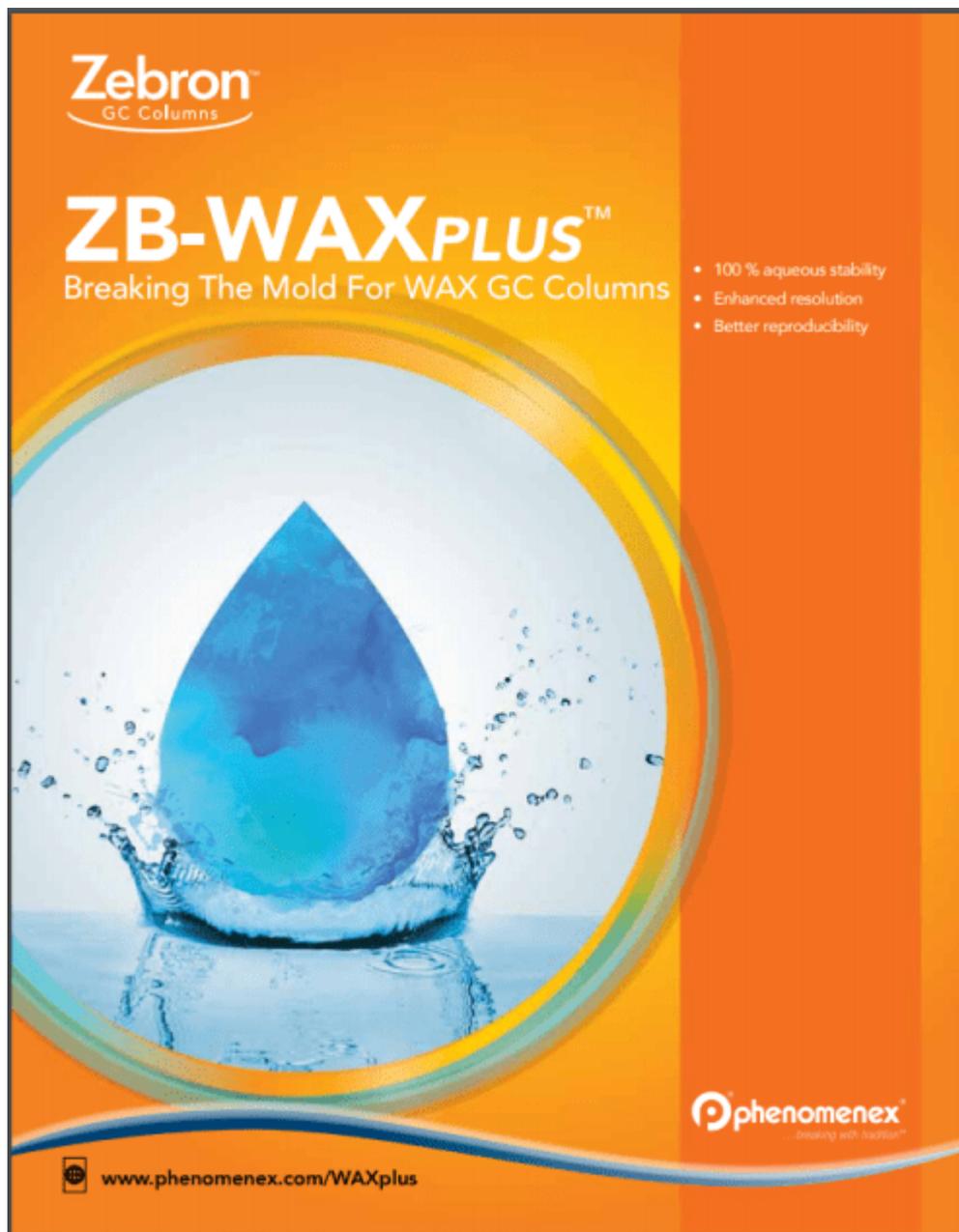
6 Diethylene glycol

7 Glycerol

8 Triethylene glycol

In fact, I have been working with clients all over the world to help optimize their alcohol methods to get even shorter run times. There have been situations where clients needed method transfer from a constant flow to constant pressure method to accommodate increased testing and faster batch release with new and old GC instrument models. Likewise, there have been cases needing to transfer seamlessly from bigger id column to narrower ID column and shorter column length to cut short their run time.

To learn more about ZB-WAX plus and its aqueous stability, please click the link or the image below:



Zebtron
GC Columns

ZB-WAXPLUS™
Breaking The Mold For WAX GC Columns

- 100 % aqueous stability
- Enhanced resolution
- Better reproducibility

 **phenomenex**
...breaking with tradition™

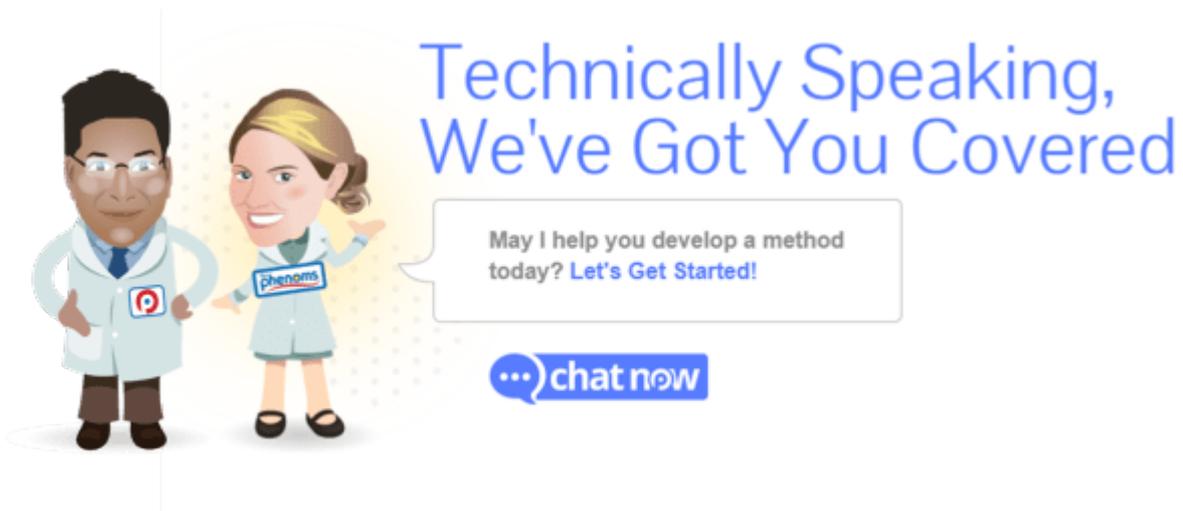
 www.phenomenex.com/WAXplus

The advertisement features a central circular graphic with a blue water droplet splashing, set against a background of orange and yellow gradients. The text is primarily in white and black, with the product name in a large, bold font.

At Phenomenex we're proud to provide support and solutions during critical situations like this period of time. Just know that our entire GC technical and manufacturing teams are here to support you. If you are currently working on or interested in reducing your alcohol GC method testing time, reach out to us right now to our Technical Specialist through Chat

Now. An instant online chat service that enables customers to obtain technical advice, quotes, product availability as well as place orders.

Start chatting now at www.phenomenex.com/chat



Share with friends and coworkers:

- [Click to email this to a friend \(Opens in new window\)](#)
- [Click to share on Twitter \(Opens in new window\)](#)
- [Click to share on Facebook \(Opens in new window\)](#)
- [Click to share on Pinterest \(Opens in new window\)](#)
- [Click to share on LinkedIn \(Opens in new window\)](#)
- [Click to share on Tumblr \(Opens in new window\)](#)
- [Click to share on Reddit \(Opens in new window\)](#)