Detecting Methanol Contamination in Hand Sanitizers Using Handheld Raman

There has been an increased demand for commercial alcohol-based hand sanitizers since the outbreak of the coronavirus SARS-CoV-2 (COVID-19). To meet this need, the U.S. Food and Drug Administration (FDA) has allowed entities that are not currently registered as drug manufacturers to register as manufacturers of over-the-counter medications and make hand sanitizers for the public , provided they follow the published guidelines of the FDA. These guidelines specify that ethanol (80% v/v) and isopropyl alcohol (75% v/v) be used as the active ingredient for hand sanitizer formulations.

However, there have been numerous reports of methanol contamination in commercially available hand sanitizers, ranging from levels of 1%-80%. Methanol is toxic and exposure to it may cause nausea, headaches, vomiting, permanent vision issues, and disruption to the central nervous system.   The FDA has

compiled a list of brands that have tested positive for methanol contamination, and has issued recalls and stoppages on importation on these products. The FDA has advised that consumers dispose of any hand sanitizer that they suspect contains methanol, and they have also created a system for the public and health care professionals to report contaminated hand sanitizers.

A TacticID®-GP Plus system was used to identify methanol in a commercial hand sanitizer that was labeled as containing 75% (v/v) ethanol (Fig. 1). The handheld Raman system was used to measure the hand sanitizer directly through the plastic bottle (Fig 2). A hit quality index (HQI) was used to match the spectrum collected from the hand sanitizer to a library reference spectrum. The spectrum of the hand sanitizer matched to a library reference spectrum of methanol (Fig. 3) with a high HQI of 95.1, indicating a good match correlation. Interestingly, no Raman signal for ethanol was observed, which suggests there is a high concentration of methanol in the product. This case study shows that handheld Raman is a useful and fast tool for the screening of hand sanitizer products suspected of methanol contamination.

[1]https://www.fda.gov/drugs/coronavirus-covid-19-drugs/hand-sanitizers-covid-19

[2]https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-reiterates-warning-about-dangerous-alcohol-based-hand-sanitizers#:~:text=However%2C%20methanol%20is%20not%20an,from%201%25%20to%2080%25.

Figure. 1

Figure. 2

Figure. 3