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Preliminary modified qualitative method of methanol in ethanol-containing beverages using image analysis of CIE Lab color system and chromotropic acid.

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Aim and objectives:

The contamination of ethanol with high level of methanol keeps going to be an important concern. If the body exposed to a high concentration of methanol, it will cause harm and eventually die. However, testing for methanol in Thailand remains limited because it requires expensive instruments and is currently only available in medical universities. This study aimed to modify the method from Association of Official Analytical Chemists (AOAC) by making it easier to use and could compare the amount of methanol from color changes in experiment tubes. These test kits could provide a preliminary assessment of safety without the need for complex equipment.

Methodology:

The method was an indirect method of measurement methanol. Briefly, we converted methanol into formaldehyde by adding substances to create an oxidation reaction. Then, adding a substance aimed to measure formaldehyde by chromotropic acid, under highly acidic conditions. Its absorbance was measured spectrophotometrically at 575 nm. If there was formaldehyde, a purple color appeared and was captured the color in these tubes by digital camera. Calculated colors were the colors in Commission Internationale de l'Éclairage. (CIELAB or CIE L*a*b*) color system among various methanol concentration reactions.

Results:

The methanol content measurement showed the results at concentrations ranging from 1-100 mg/dl in 40% ethanol samples. Testing with chromotropic acid indicated a good linearity ($R^2=0.899$), and the duration of entire test took less than 30 minutes; the results could be observed immediately.

The results indicated a strong correlation between the CIE Lab color system and the chromotropic acid method for detecting methanol in 40% ethanol. The number of L*, a* and b* from CIE Lab color system had a strong correlation with test results, with R^2 values of 0.9959, 0.9549, and 0.9331,



respectively, and showed distinct color values that were visible to unaided eyes.

Conclusions:

The rapid, simple, and field-applicable test kit of methanol was developed successfully by detecting the different color. In Thailand, alcoholic beverages also contain different concentrations of ethanol, so the development of the method for detecting both ethanol and methanol in other concentrations should be further investigated.