

DEVELOPMENT OF AT-HOME TEST KITS FOR EVALUATION OF ALCOHOL IN HAND SANITIZER AND ANEMIA

CHIRAPHA PRAKOBDI 6236283 SCCH/M

M.Sc. (CHEMISTRY)

THESIS ADVISORY COMMITTEE: PHOONTHAWEE SAETEAR, Ph.D., DUANGJAI NACAPRICH, Ph.D., THANTHAPATRA BUNCHUAY, D.Phil, CHARLES SHERMAN HENRY, Ph.D.

ABSTRACT

This research aimed to fabricate the ideas for developing the at-home test kits serving the SDG3 ‘Good health and well-being’. We had initiated ideas of developing test kits as 2 types according to type of sample and its matrices.

First, detection adulterated and legal alcohols in alcohol-based hand sanitizer during the situation of COVID-19 pandemic were developed to evaluate the quality of alcohol-based hand sanitizer. To detect an adulteration of MeOH for avoiding its toxicity, colorimetric method based on the oxidation reaction and Schiff’s test was employed to form the colored product detectable by either naked eyes or photometer, leading to the rejection of the use of product. After detecting the adulteration of methanol, quantifying the concentration of legal alcohols (ethanol or isopropanol) for indicating the disinfectant effectiveness of alcohol-based hand sanitizer was then determined. Turbidimetric method based on the iodoform reaction was used to produce the yellowish iodoform precipitates. Turbidity would relate to the concentration of legal alcohols in hand sanitizer, leading to the evaluation of disinfectant efficiency of the product.

Second, quantification of human salivary iron for preliminary screening the iron deficiency anemia (IDA) was also developed. The evaluation of IDA was studied by investigating free iron in human saliva or so-called salivary iron. The commonly chemical reaction called ‘bathophenanthroline method’ was employed to develop a color product. This reaction was performed under the concept of LFA to develop

nitrocellulose membrane. The color was measured via taking a photo and subsequently analyzed with the ImageJ processing program. Grey intensity was then used to construct the calibration curve and determine the level of human salivary iron to screen for IDA.

IMPLICATION OF THE THESIS

This research provides evaluations of hand sanitizer quality that can be beneficial in detection adulterated methanol and investigates the disinfectant effectiveness to reduce users' risks from use of substandard consumables. Also, the diagnosis of IDA is useful for investigating iron in human saliva, this non-invasive method especially benefits young children as it can decrease the severity from health issues. Both methods allow people to receive a better quality of life and decrease any health risks.

KEY WORDS: AT-HOME TEST KITS / ALCOHOL / IRON DEFICENCY
ANEMIA / ADULTERATION / SHIFF'S REACTION /
COLORIMETRIC METHOD / TURBIDIMETRIC METHOD/
IODOFORM / LATERAL FLOW ASSAY

106 pages