WHO TobLabNet
Official Method
SOP 11

Standard Operating Procedure for Determination of Nicotine, Glycerol and Propylene Glycol in E-Liquids

No Tobacco Unit (Tobacco Free Initiative)
Tobacco Laboratory Network (TobLabNet)

World Health Organization

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World Health Organization

World Health Organization Tobacco Laboratory Network

Standard operating procedure for method

Determination of nicotine, glycerol and propylene glycol in e-liquids

Method:	Determination of nicotine, glycerol and propylene glycol in e-liquids
Analytes:	Nicotine (3-[(2S)-1-methylpyrrolidin-2-yl]pyridine) (CAS # 54-11-5) Glycerol (propane-1,2,3-triol) (CAS # 56-81-5) Propylene glycol (propane-1,2-diol) (CAS # 57-55-6)
Matrix:	e-liquid
Last update:	March 2021

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FOREWORD

This document was prepared by members of the World Health Organization (WHO) Tobacco Laboratory Network (TobLabNet) in cooperation with member laboratories of the European Joint Action on Tobacco Control (JATC) as an analytical method standard operating procedure (SOP) for measuring nicotine, glycerol and propylene glycol in e-liquids.

INTRODUCTION

In order to establish comparable measurements for testing e-liquids globally, consensus methods are required for measuring specific contents of e-liquids. The Conference of the Parties (COP) to the WHO Framework Convention on Tobacco Control (WHO FCTC) at its sixth session (Moscow, Russian Federation, 13–18 October 2014) requested the Convention Secretariat to invite WHO to: (a) prepare an expert report on electronic nicotine delivery systems (ENDS) and electronic non-nicotine delivery systems (ENNDS) for the seventh session of the COP (COP7), with an update on the evidence of the health impacts of ENDS/ENNDS, their potential role in quitting tobacco usage and impact on tobacco control efforts; (b) subsequently assess policy options to achieve the objectives outlined in paragraph 2 of decision FCTC/COP6(9); and (c) consider the methods to measure the contents and emissions of these products.[1]

As nicotine content is limited to a certain concentration in some parts of the world (for example, in the European Union, the maximum nicotine concentration in e-liquids is 20 mg/mL), nicotine is considered a priority component to be measured in e-liquids. Since glycerol and propylene glycol are typically ingredients of e-liquids and can be measured simultaneously with nicotine, these components are included in the SOP.

This SOP was prepared to describe the procedure for the determination of nicotine, glycerol and propylene glycol in e-liquid and based on ISO 20714 [**2.1**].

1 SCOPE

This method is suitable for the quantitative determination of nicotine, glycerol and propylene glycol in e-liquids by gas chromatography (GC). The working range of the method is for 1 to 30 mg/mL nicotine, for 200 mg/mL to 1000 mg/mL propylene glycol and for 200 mg/mL to 1000 mg/mL glycerol.

[1] Decision FCTC/COP6(9).

2 REFERENCES

2.1 *ISO 20714 (en). E-liquid—Determination of nicotine, propylene glycol and glycerol in liquids used in electronic nicotine delivery devices—Gas chromatographic method (ISO 20714:2019, IDT).*

2.2 *ISO 13276: Tobacco and tobacco products—Determination of nicotine purity—Gravimetric method using tungstosilicic acid.*

2.3 *ISO 5725-2: Accuracy (trueness and precision) or measurement methods and results—Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method.*

2.4 *World Health Organization. Standard operating procedure for validation of analytical methods of tobacco product contents and emissions. Geneva, Tobacco Laboratory Network, 2017 (WHO TobLabNet SOP 02)* (https://www.who.int/tobacco/publications/prod_regulation/standard-operation-validation-02/en/, accessed 10 December 2020).

2.5 *United Nations Office on Drugs and Crime. Guidelines on representative drug sampling. Vienna, Laboratory and Scientific Section, 2009* (http://www.unodc.org/documents/scientific/Drug_Sampling.pdf, accessed 10 December 2020).

3 TERMS AND DEFINITIONS

3.1 *Nicotine content*: total amount of nicotine in e-liquid, expressed as mg per millilitre of e-liquid.

3.2 *E-liquid*: liquid or gel which may or may not contain nicotine intended for aerosolization, to be inhaled with an electronic delivery device.

3.3 *Electronic nicotine delivery device system/electronic non-nicotine delivery system*: device used to aerosolize an e-liquid for inhalation.

3.4 *Laboratory sample*: sample intended for testing in a laboratory, consisting of a single type of product delivered to the laboratory at one time or within a specified period.

3.5 *Test sample*: product to be tested, taken at random from the laboratory sample. The number of products taken shall be representative of the laboratory