

Using Lyophilization To Make Reagent Pellets For Rapid Covid 19 Testing.

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Abstract—With the widespread infection of Covid 19, development of rapid Covid 19 tests is essential. Lyophilization is a drying process that allows for long term stability. Many factors come into play when trying to successfully Lyophilized reagents including the ingredients of the reagent. If the proteins of the reagent are broken down in the process, the reagent is no longer effective in detecting Covid 19 in a patient. Once Iypolization is successful you must look at how tests can be distributed. While determining the best distribution method, a Point of care testing device is required.

Keywords: Lyophilization, Covid 19, Reagent, CRISPER, Trehalose, Xylitol

Project Description

COVID-19 has spread across the globe and infected millions of humans. Developing countries lack the technology to detect and treat COVID-19. To prevent the spread of disease, there is a critical need for quick, sensitive, reliable, point-of-care and economical methods for the laboratory diagnosis. [1] In this study, we are looking at reagent mixtures to lyophilize and create a point (PoC) of care device.



Figure 1:

Effective reagents are critical for the detection of Covid-19 (figure 1). Reagents contain biological components which must be preserved during lyophilization. Reagents include enzymes, primers, nucleotides, probes and 4 biomarkers. At high temperatures, the enzymes in the reagent will break down and become ineffective.

A reagent is a chemical substance that is utilized to facilitate a chemical reaction. Reagents can be composed of many substances. We will focus on the enzymes in the reagent that are vital in detecting the RNA strands found in Covid-19. The multitude of mechanisms involving enzymes that are utilized to catalyze chemical processes is extensive. We will look at some of the common processes that can be

manipulated to generate signals in order to detect the presences of diseases such as Covid-19.

Point of care testing (PoCT) is essential in underdeveloped countries where technology, medical professions, and financial stability are scarce. PoCTechnologies can be separated into two categories. The first is a large table-top device that is used for analysis. While the devices are still large, they have been reduced in size and complexity. These include critical care analysers and, more recently, small haematology and immunology analysers [2]. The second category that was the focus of the study are small smaller handheld devices that provide qualitative and/or quantitative data.

Point of care testing devices must follow guidelines set by the World Health Organization (WHO). ASSURED guidelines were developed to ensure that the technology can address the needs of the user in a clinically and cost effective manner and avoid the introduction of possibly expensive devices which fail to deliver the required outcomes. [2] ASSURED is an acronym meaning affordable, sensitive, specific, user-friendly, rpid and robust, equipment-free, and deliverable to end users. The device must be affordable to those at risk of becoming infected. [3]

Fig. 2: Schematic showing different technical components that could combine to form the ideal diagnostic test.

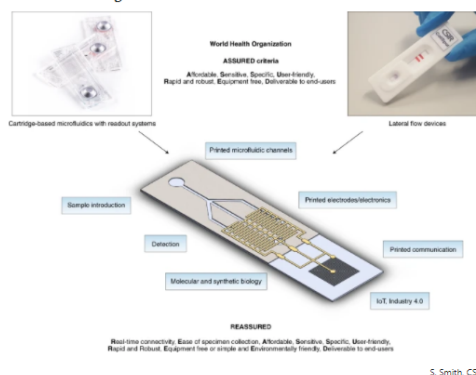


Figure 2: [3]

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