

Multichannel Pipette with the Ability of Transferring Various Amounts in Each Channel

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ABSTRACT

Micro pipettes are utilized in laboratories for transferring different amounts of liquids varying from 0.1 to 1000 μL . The most common science fields that they are being used includes biology, chemistry pharmaceutical, and drug discovery labs, and etc. Multichannel is 8 or 12 channel micro pipettes that mostly used to fill wells of micro plates which are available in various sizes. In this project a multichannel has been built with the ability of transferring various amounts in each channel.

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1 Introduction

Micro pipettes were invented and patented in 1957 at University of Marburg, Germany by postdoc Heinrich Schnitger (Fig. 1). The prototype included a spring-loaded piston and a removable plastic tip for containing liquid [1].



Fig. 1: Schnitger's prototype

They can function either via air displacement or by positive displacement principles. In air displacement, an air cushion separates the liquid in the plastic tip from the piston in the pipette. As with any gas, air cushion changes according to the liquid's characteristics, depends on lab or protocol conditions (temperature variation, or humidity). With positive displacement principle, a piston replaces the air cushion and slides along the internal sides [2].

Micro pipettes are the easiest way to increase your output and efficiency, while reducing assay, testing and production costs at the same time. This device will reduce the hours consumed by pipetting and thus, the risk of repetitive strain injury (RSI) will decrease as well. Reducing RSI can save your lab costs by preventing slower pipetting or even the shutdown of the operation due to injury. The ability to pipette 8 or 12 samples or dispense reagents into 8 to 12 wells at a time is hugely beneficial when performing assays involving enzymatic reactions, where liquid handling speed, as well as accuracy, is key.

Polymerase chain reaction or PCR is technique that is used to make many copies of specific DNA. As the results, Multichannel is more useful and efficient in assays using this technique.

2 Methods and Materials

The MTT assay is a colorimetric analysis for assessing cell metabolic activity. An enzyme-linked immunosorbent assay, called ELISA or EIA, is a test that detects and measures antibodies in your blood which is a protein that your body produces in respond to harmful substances called antigen [3]. In those and other enzymatic assays, the

transferred amounts should be different in each micro plate's well and using a micro pipette is not a choice here because it will cost 8 to 12 times more time to fill a 96 micro plate than using a multichannel pipette. It will also decrease testing and production. Using a multichannel pipette is also not an answer because of the same amount distribution in each channel.

Accordingly, creating a multichannel pipette which transfers various amounts of liquid in each channel was decided. The implanted mechanical plan contains of at least three micro pipettes which are put next to each other in a multichannel pipette case (Figs. 2 and 3).



Fig. 2: Three Micro pipettes



Fig. 3: The Multichannel case

The useless parts should be removed for a better perspective of the display. A lever that is mainly built from screws, nuts, and a handle was applied at the bottom of the three micro pipettes, making it able to push them all down at the same time. To solve the issue of the distances between the tips (which is the standard distance of 4.5mm in multichannel pipettes), a plastic hose was put to use. At the bottom, a spring is embedded as a tip ejection key (Figs.



Fig. 4: Removing useless parts



Fig. 5: Applied plastic hose

3 Conclusion

Here is an evaluation we did using a Growth medium (Table 1) (Fig.6).

Table 1 : comparison of micro pipette and multichannel

Properties	micropipette	The discussed multichannel pipette
Filled wells	6	6
Time span	57 seconds	9 seconds
Times to change the quantity	6	1



Fig. 6: Various transferred volumes

References

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