

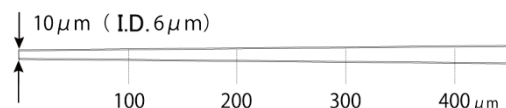
Tips for Quantitative Microinjection using IM-300 and IM-31

IM-300 and IM-31 are the microinjectors which allow for reproducible microinjection with the aid of compressed air. This NARISHIGE WEB NEWS discusses a microinjection method by which quantitative microinjection is theoretically possible. Recently, an increasing number of potential users tend to find this question when consider a product to buy, this NARISHIGE WEB NEWS can help you have the idea of a possible method so that you can have better understanding of the product information in the catalogue.

Key Point for Quantitative Microinjection

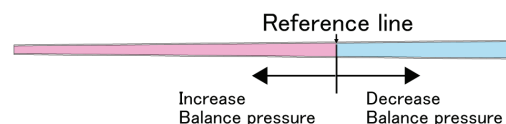
For quantitative microinjection, it is important to use a pipette with high parallelism (the pipette with a particular diameter remain long). It decreases difference of fluid pressure in the pipette between one point and another and helps prevent the pipette from clogging during injection. Also it helps provide a better calculated injection amount which is close to the reality.

When you use high viscosity fluid, you may need a pipette with a large inner diameter or you may need some adjustments for the pipette tip.

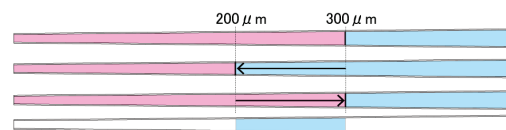


Theoretical Value for Injection Amount

Before you start quantitative microinjection in your work, you need an examination in which you load a dye in your pipette and inject it in mineral oil. When the pipette is put in the mineral oil, capillary action works to get the mineral oil into the pipette. (After you turn the Balance Pressure Adjustment to the lowest and) you turn Balance on, you find the fluid coming in the pipette by capillary action stop at a point when it becomes equal to balance pressure. (Now we call the balanced position the reference line.) Now you have the reference line, you can increase Balance pressure to move the reference line toward the pipette tip, you can decrease Balance pressure to move the reference line backwards.



Now you bring the pipette under the view of microscope to decide the position of reference line and examine action in injection. Right after the injection, you find the pipette sucks the mineral oil again up to the reference line. If the reciprocation is visually 100 μm and if you assume it has happened in a cylinder, the injection amount can be calculated in the following way where inner diameter is 6 μm and depth is 100 μm theoretically.

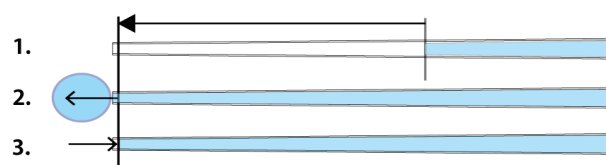


$$\text{【Volume】} \quad (\text{Radius}) \times (\text{Radius}) \times \pi \times (\text{Depth}) = 0.003\text{mm} \times 0.003\text{mm} \times 3.14 \times 0.1\text{mm} = 0.000002826\text{mm}^3 = 2.8 \text{ pico Liter}$$

Method for Quantitative Microinjection

Now, continue the discussion to inject 2.8pL (approx.)

You turn Balance Pressure Adjustment Knob to increase balance pressure and bring the reference line around the pipette tip, then finally you perform injection. The injected amount is theoretically 2.8pL (approx.).



By this way, you can perform quantitative microinjection.

In the Actual Microinjection

The discussion here you have is just an example in which the calculated injection amount is theoretical. The fluid injected from the pipette tip can be sucked back to the pipette due to capillary action therefore this method may or may not work depending on the setting given. Also, when you have a different condition such as injection in the air and injection in viscous fluid, you can have a different injection amount. Despite the fact, having an idea of how you can calculate a theoretical value and the examination process you take to get the approximate value of injection amount is still important for you in choosing your injector and when performing quantitative microinjection.

If you have any questions or need further information, please contact us.

Narishige Group Website

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