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Standard Operating Procedure (SOP): Micropipette (Sampler) Operation

1. Objective

To define the standard operating procedures for the accurate and safe use, maintenance, and handling of laboratory micropipettes (samplers).

2. Scope

This procedure covers the aspiration, dispensing, and precise transfer of liquid volumes using adjustable micropipettes.

3. Responsibility

The responsibility for implementing this procedure lies with the laboratory staff.

4. Operating Procedure

- Attachment:** Securely attach a compatible pipette tip to the shaft of the micropipette.
- Aspiration:**
 - Depress the control button to the **first stop**.
 - Submerge the tip into the liquid (approximately 3 mm deep).
 - Maintain a **vertical position** and release the button **slowly** to aspirate the liquid.
- Dispensing:**
 - To dispense, place the tip against the inner wall of the target vessel (at a 10–40° angle).
 - Press the button to the **first stop** to release the main volume.
 - Wait **1–3 seconds**, then press to the **second stop** to expel any remaining liquid.
- Volume Accuracy Protocols:**
 - Volumes $\geq 10 \mu\text{l}$:** Pre-wet the tip by aspirating and dispensing the sample 2–3 times before the final transfer to ensure interior coating.
 - Volumes $< 10 \mu\text{l}$:** Use a dry (unwetted) tip. After dispensing, rinse the tip with the recipient liquid to ensure total volume transfer.

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5. Handling Tips:

- **Exterior Cleaning:** After aspiration, touch the tip to the upper wall of the vessel to remove external droplets. If necessary, wipe the outside with a lint-free cloth, ensuring the cloth does not touch the liquid inside the tip.
- **Adjusting Volume:**
 - **To decrease volume:** Turn the dial slowly until the target volume is reached.
 - **To increase volume:** Turn slightly past the target volume, then turn back to the exact setting.

5. Safety Precautions

1. **Biohazard Prevention:** Contaminated samplers pose a significant health risk to personnel. Treat all samplers used with infectious materials as hazardous.
2. **Horizontal Storage Prohibition:** **Never** place a micropipette on the workbench in a horizontal position while a tip containing liquid is attached. This allows liquid to backflow into the internal mechanism, leading to contamination and potential failure.

6. Maintenance and Calibration

1. **Cleaning:** Clean the exterior of the sampler after each use using a mild detergent, water, or 60–70% ethanol.
2. **Aerosol Protection:** Aerosol contamination affects both the accuracy of experimental results and the longevity of the instrument.
3. **Internal Contamination:** If liquid is accidentally aspirated into the main body (due to over-filling or horizontal placement), the device must be professionally cleaned/decontaminated immediately.
4. **Vertical Storage:** Always store the micropipette in an upright, **vertical position** on a dedicated pipette stand.
5. **Tip Attachment:** Ensure tips are attached firmly to maintain an airtight seal.
6. **Annual Service:** The micropipette must be serviced **at least once per year**. This includes recalibration, lubrication of mechanical parts, and replacement of internal seals (O-rings). This maintenance must be performed by authorized, qualified personnel in a certified facility.

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