SOP: Preparation and Concentration Check for Detergent Solutions

1. Purpose

This SOP details the **preparation and concentration check of detergent solutions**, including selecting appropriate detergents, measuring accurate quantities, mixing procedures, ensuring homogeneous solutions, verifying concentration levels through standardized methods, maintaining solution stability, and documenting preparation records. The purpose is to guarantee effective cleaning performance and safety by ensuring detergent solutions are prepared and used at optimal concentrations.

2. Scope

This procedure applies to all laboratory, production, or maintenance staff responsible for preparing and verifying detergent solution concentrations for cleaning or sanitization purposes.

3. Responsibilities

- Ensure only approved detergents are used.
- Precisely measure and record all ingredients.
- Perform concentration verification as outlined.
- Log all preparation and verification activities.
- Report discrepancies or issues immediately to the supervisor.

4. Materials & Equipment

- Approved detergent(s) and solvents (as required)
- Analytical balance / graduated cylinders / volumetric flasks
- Mixing vessels or beakers (clean and dry)
- Magnetic stirrer or mechanical mixer
- Pipettes or dispensing equipment
- Personal Protective Equipment (PPE): gloves, safety goggles, lab coat/apron
- Standardized concentration testing kit or method (e.g., titration kit, refractometer)
- Preparation record/logbook

5. Procedure

1. **Selection:** Confirm detergent type and target concentration based on cleaning requirements and manufacturer's instructions.
2. **Preparation:**
    - Calculate quantities required for the target solution volume (see calculation table below).
    - Wear appropriate PPE before handling chemicals.
    - Weigh or measure the required amount of detergent accurately.

- Add detergent to the mixing vessel containing the appropriate volume of solvent (usually deionized or distilled water).

3. **Mixing:**
   - Stir the solution using a magnetic stirrer or mixer until fully dissolved and homogeneous.
4. **Concentration Verification:**
   - Sample an aliquot of the prepared solution.
   - Test using a standardized method (e.g., titration, refractometer).
   - Compare measured concentration with target. If outside specifications, adjust and retest.
5. **Solution Stability:**
   - Label container with solution type, concentration, preparer, and date.
   - Store under conditions stated by the detergent manufacturer.
   - Note expiry or recommended usage period.
6. **Documentation:**
   - Record all preparation details, concentration checks, and any corrective actions in the logbook or specified database.

6. Calculations

Desired Concentration	Total Solution Volume	Amount of Detergent to Add	Calculation Formula
X% (w/v)	V (L)	D (g) = X (g/100 mL) Ã— V (L) Ã— 1000	`D = X Ã– V Ã– 10`
Y% (v/v)	V (L)	D (mL) = Y (mL/100 mL) Ã— V (L) Ã— 1000	`D = Y Ã– V Ã– 10`

> **Note:** Adjust formula based on detergent nature (solid/liquid) and units.

7. Acceptance Criteria

- Prepared solutions must fall within Â±5% of the target concentration, unless otherwise specified.
- Solution must be visually homogeneous and free from particulates or precipitates.
- Deviations must be reported and corrective action taken.

8. Documentation

- Record date, batch, preparer, detergent type/lot, quantities, final concentration, and verification results.
- Attach supporting data (test results, calculation worksheets).
- Maintain records per quality system requirements and for auditing purposes.

9. References

- Detergent manufacturer's technical data sheets
- Internal laboratory quality manual
- Associated safety data sheets (SDS)

10. Revision History

Version	Date	Description	Approved By
1.0	2024-06-01	Initial Release	[Name/Title]