

MicroChem 303 A Developer

PRODUCT PROFILE

MicroChem 303 A Developer is an aqueous alkaline solution. It is suitable for all general microelectronic applications.

COST EFFICIENT

- Excellent exposure throughput

HIGH PROCESS RELIABILITY

- Tight product specifications
- Stringent quality control

EXCELLENT RESOLUTION

- High differential solubility
- Excellent development tolerance
- No swelling of photoresist

HIGH INSPECTION YIELDS

- Clean development
- Wide process latitude

AUTOMATION

- Immersion
- Batch spray

INSTRUCTIONS FOR USE

Bath Make-up

Dilute MicroChem 303 A Developer for use as follows:

	High Speed Make-up (25% solution)	High Resolution Make-up (20% solution)
MicroChem 303 A	1 part b/v	1 part b/v
Deionized water	3 parts b/v	4 parts b/vB

Mix thoroughly. Proper dilution can be verified by analysis for normality. See Determination of Total Alkaline Normality Section.

Photoresist dissolution rate increases with increasing developer concentration. Maximum resolution is obtained at lower developer concentration.

Temperature

Operate MicroChem 303 A Developer bath between 20° and 25°C, with the temperature controlled $\pm 1^\circ\text{C}$. The photoresist dissolution rate increases with increasing developer temperature.

In spray equipment, the spray action causes a temperature drop in the developer solution. For this reason, developer temperature should be monitored at the substrate surface.

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Time

Immersion: 1-3 minutes

Spray: Varies with equipment; consult your MicroChem Technical Sales Representative.

Longer development times permit the use of shorter exposure times. Shorter development times minimize developer attack on the unexposed photoresist. The range recommended is optimum. We recommend keeping the development time constant and adjusting the exposure time as necessary to meet critical dimension requirements.

Agitation

Immersion: Mild, consistent agitation is recommended.

Rinse

Immersion: Cascade rinse with deionized water to resistivity specification immediately after developing.

Spray: Deionized water rinse immediately after developer cycle to prevent developer drying on substrate surface; equipment should provide adequate rinsing of back side of substrates.

Bath Control

Immersion: For maximum process control, replace bath with fresh developer solution at least once per shift; keep bath covered when not in use.

Spray: As recommended by equipment manufacturer.

DETERMINATION OF TOTAL ALKALINE NORMALITY

I. Reagents

- a) Hydrochloric acid (HCl), 0.1N, standardized
- b) Phenolphthalein indicator, 1% in 95% ethanol

II. Procedure

- a) Pipette 5 ml of MicroChem 303 A Developer bath into a 250 ml Erlenmeyer flask.
- b) Add approximately 100 ml deionized water.
- c) Add 5 drops of phenolphthalein indicator.
- d) Titrate with 0.1N HCl from pink to clear brown color change.

III. Calculation

$$\frac{\text{ml HCl titrated}}{5 \text{ ml}} \times N \text{ HCl} = \text{Normality of MicroChem 303 A Developer}$$

IV. Results

The normality of freshly made-up MicroChem 303 A Developer bath should be:

1: 3 make-up $0.43 \pm 0.02N$

1: 4 make-up $0.34 \pm 0.02N$

Note: MicroChem 303 A Developer CD solutions are delivered $\pm 0.01N$.

EQUIPMENT

Use polypropylene, polyethylene, 316 stainless steel, polytetrafluoroethylene, or equivalent materials.

PROPERTIES AS DELIVERED

MicroChem 303 A Developer is manufactured to the highest quality standards and is subjected to state of the art testing for physical, chemical, and functional properties to assure the user of maximum lot-to-lot reproducibility.

Certificates of Analysis will be supplied with each shipment upon request. Quality Assurance Material Specifications and Analytical Testing Procedures may be obtained upon request from your MicroChem Sales Representative.



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PRODUCT DATA (TYPICAL PROPERTIES)

Specific Gravity @ 20/20°C:	1.079-1.087
Appearance:	Brown solution
Turbidity:	Non-turbid
Total Alkaline Normality:	1.67-1.73

HANDLING PRECAUTIONS

Before using this product, consult the product Safety Data Sheet for details on product hazards, recommended handling precautions, and product storage.

STORAGE

Store MicroChem 303 A Developer only in upright, original containers in a dry area at 50°–90°F. Store away from acids. Do not store in sunlight. Store away from heat and sources of ignition. Keep container sealed when not in use.

DISPOSAL CONSIDERATIONS

Dispose in accordance with all local, state (provincial), and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

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