

GENERAL DESCRIPTION

DeContam® is an aggressive cleansing agent specifically formulated for the electronic, aerospace, and nuclear industries. This multi-purpose product is ideal for:

1. **Removing contaminants from:** electronic components, vacuum tubes, glass and most metals, plastics, rubber, Silica, quartz, fabrics and skin.
2. **RadioDecontamination:** highly effective for removal of surface radioactive contamination.

Safe and Efficient - DeContam® is an extremely efficient, non-foaming surface acting agent that is mildly alkaline. Unlike environmentally hazardous cleaners such as dichromate-sulfuric acid, trichloroethane, and freon, DeContam® contains no aromatic hydrocarbons or chlorinated solvents and is biodegradable. A 2% solution has a pH of 10 and is generally not harmful to skin or clothing. Yet, it's aggressive cleansing action removes a broad spectrum of contaminants typically introduced during manufacturing processes. Tests have shown that when a silica disk is cleansed with a 2% solution of DeContam® it gives a spectrophotometer reading of 11.65.

Removes Radioactive Contamination - DeContam® is particularly suitable for use in pathology and bacteriology laboratories and Decontamination of radioactive objects. Tissue culture and enzymological equipment can be cleaned without fear of temporary or cumulative toxic effects. Additionally, the product is useful for the clean-up and decontamination of objects and human skin exposed to radioactive isotopes. It is recommended for use in laboratories where radioactive tracers are used and in hospitals where radioactive isotopes are employed for therapeutic purposes. Meets or exceeds EPA, USDA, and OSHA standards.

Economical - DeContam® is economical and has an attractive price-to-performance ratio as measured by rapidity and effectiveness of cleansing action. It is available in four convenient sizes: 1 Gallon, Case (4 gallons), Drum (5 gallons), and Drum (55 gallons).

GENERAL APPLICATIONS

DeContam® is used in a variety of industries over a broad spectrum of applications:

- Electro-Optics:** Surface preparation of optical surfaces prior to deposition.
- Laser Disk Manufacturing:** Surface cleaning of laser disks prior to deposition.
- Aerospace:** Treatment of metallic surfaces to reduce outgassing in high vacuum.

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GENERAL APPLICATIONS

LCD Display Screen Manufacturing: Cleaning of coated surfaces.

Nuclear Power Industry: General decontamination applications.

Electronics: Removal of silicon grease from components.

Semiconductor Industry: Micro-decontamination of fused quartz tube diffusion furnaces used in wafer manufacture, degreasing of chips and wafers.

Fusion Research: Cleaning of fused quartz plasma containment tubes.

Computer Industry: Degreasing of printed circuit boards.

Thin Films: Cleaning of substrates prior to thin film deposition.

Petroleum Industry: Removal of crude oil/tar deposits from equipment and instruments.

Jewelry Industry: Cleaning of oxidation from precious metals and cleaning gem stones.

General Laboratory Use: Cleaning of laboratory glassware.

ENVIRONMENTAL IMPACT

DeContam® has been in continuous commercial use for over 40 years. It is both nontoxic and biodegradable from the chemical point of view. DeContam® has no constituents that would cause it to be classified as a hazardous substance or as a hazardous solid waste under EPA, OSHA and even strict California State regulations. DeContam® is non-carcinogenic and is considered non-hazardous.

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DIRECTIONS FOR USE

CLEANING/DEGREASING CERAMICS AND PORCELAIN

Over 40 years of use has established the effectiveness DeContam® as a cleaner of vitreous substances, while at the same time, non-hazardous to the environment. By extension, DeContam® performs well with most ceramics and porcelains.

Certain ceramic products require that the surfaces of ceramic substrates be treated and cleaned prior to deposition of coating materials. DeContam® has shown itself to be highly effective in cleaning ceramics both BEFORE and AFTER the application of coatings.

Certain important considerations exist in establishing procedures for the cleaning of ceramics, both before and after coating. One of the most important procedural aspects is to incorporate, in the cleaning/degreasing process, a THOROUGH post-cleaning, rinsing/washing with D.I. water.

Equally important consideration must be given to porosity of the substrate and the thickness and uniformity of applied coatings since these parameters will affect both the optimal DeContam® concentration and the temperatures at which cleaning is to take place.

SUGGESTED PROCEDURE:

1. Perform tests on selected samples of the BARE ceramic substrate.
2. Use an initial 15% concentration of DeContam® aqueous solution.
3. If it is practical to fully immerse the production item, then immerse in bath at room temperature. For non-immersible surfaces, treat by spraying, scrubbing or wiping the surface with the solution at room temperature.
4. Increase the concentration, solution temperature and agitation as required to improve the cleaning effectiveness and reduce processing rates.
5. Rinse THOROUGHLY with deionized water, either by bath immersion, surface wiping, or spraying.

For post-coating deposition cleaning, the procedure is generally the same as above except that DeContam® concentrations in the 10% range may be used as an initial baseline for establishing procedures. Please contact ESPI for further technical assistance.

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GENERAL CLEANING PROCEDURE

The effectiveness of DeContam® as cleaning agent is a function of the following variables:

1. The CONCENTRATION of the solution
2. The TEMPERATURE of the solution
3. IMMERSION time
4. Type of AGITATION (Wiping, spraying or ultrasonic)

CLEANING OF FUSED QUARTZ TUBES

The cleanliness of ovens used in wafer manufacturing is absolutely vital. Any micro-contamination can cause the rejection of expensive production batches.

Now that hundreds of highly complex chips are being diced from a single wafer, definition of purity in wafer processing has taken on a new meaning.

All of the above mentioned processes require ovens/furnaces made of highly pure (99.95) fused quartz tubing. This tubing must be periodically cleaned of production/experimental deposits and contamination.

Fused quartz tubing is also used in laser technology and in fusion and plasma research. The fused quartz tubes used in all these applications must be as free as possible from surface contamination resulting from continuous production use.

DeContam® has proved to be safe, practical, more effective and economical than the use of hydrofluoric or chromic acid solutions traditionally used for the cleaning of fused quartz.

Procedures currently used by our customers require nearly 100% aqueous concentration of DeContam® and complete immersion of the tube in the solution.

Immersion TIMES can range from 30 minutes to overnight depending on the severity of contaminating deposits. Immersion TEMPERATURES can range from 120 °F to near boiling as a function of turn-around time required for cleaning, as well as severity of deposits.

Thoroughly rinse in a deionized water bath after immersion in DeContam® solution.

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SUGGESTED PROCEDURE:

1. Fill immersion tank with a 90% aqueous solution of DeContam®.
2. Fully immerse tube in appropriate immersion tank.
3. If production process allows, let soak overnight.
4. To accelerate the cleaning process the solution may be heated. Effective and rapid cleaning will occur in the range of 120 °F to boiling, depending on production requirements and the nature of surface contamination.
5. For general cleaning, 120 °F will yield good results after 30 minutes immersion time.
6. If possible, rotate the tube in the solution. This mild agitation improves the efficiency of the cleaning process.
7. After removal from the DeContam® bath, fully immerse tube in a deionized water bath, rinse thoroughly and dry under halogen heat lamp.

LABORATORY TEST RESULTS (The Behavior of DeContam® For Degreasing of Glass)

PRODUCT DESCRIPTION

DeContam® Concentrate is a non-foaming surface acting cleaning agent. DeContam® is largely non-corrosive and non-toxic. A 2 % solution has a pH of 10, which is that of a 0.001N caustic soda solution, and has been demonstrated to have no deleterious effects on skin, clothing, most metals, glass, plastics, rubber, quartz, or silica. Due to the alkaline nature of DeContam® solutions, some metals may be lightly etched, particularly in warm solutions.

Optical density measurements show that DeContam® leaves no residue whatsoever after rinsing with deionized water and that it is more effective than dichromate-sulfuric acid for cleaning of glassware. Tissue culture and enzymological glassware can be cleaned without fear of temporary or cumulative toxic effects. The laboratory test results of the cleaning abilities of DeContam® have revealed it to be highly effective in removing many types of greases and petroleum by-products. These include:

- ◆ Dow Corning Silicon Vacuum Grease
- ◆ Apiezon Vacuum Grease
- ◆ Asphalt
- ◆ Lubriscal Stopcock Grease
- ◆ Canada Balsam
- ◆ Tar Roofing Sealer

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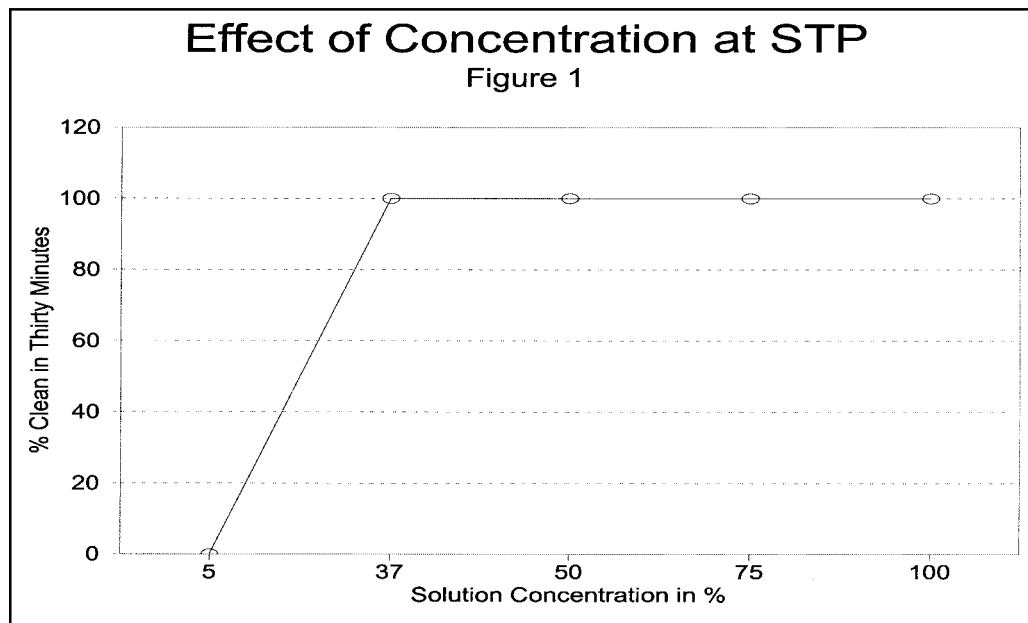
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PRODUCT DESCRIPTION (Con't).

As anticipated, it may be concluded from the tests, that the effectiveness of DeContam® improves by increasing the temperature and concentration of the solution. An interesting finding indicates that at room temperature (STP), a “cleaning concentration limit” appears to exist for DeContam®, beyond which increased concentration no longer affects cleaning effectiveness. Similarly, for a given concentration of DeContam®, a “cleaning temperature limit” appears to exist beyond which no further decrease in cleaning time may be achieved by increasing the temperature of the solution. At ROOM TEMPERATURE, a 50%, by volume, aqueous solution of DeContam® removed all of the above contaminants from the surface of a glass plate within a 24-hour period.

EFFECT OF CONCENTRATION AT STP

The effect of CONCENTRATION is apparent in Figure 1, which shows that Silicon vacuum grease is removed more thoroughly from glass as concentration increases. It is interesting to note that for full removal within 30 minutes, a minimum concentration of approximately 30% is required. Lower concentrations will not achieve complete cleaning within 30 minutes, implying that soak-time must be increased.



DeContam® Soak-Cleaning
Removal of Silicone Grease from Glass Surfaces
Percent Clean in Thirty Minutes vs. Concentration in Volume Percent
(Aqueous Solution, Temperature=25°C)

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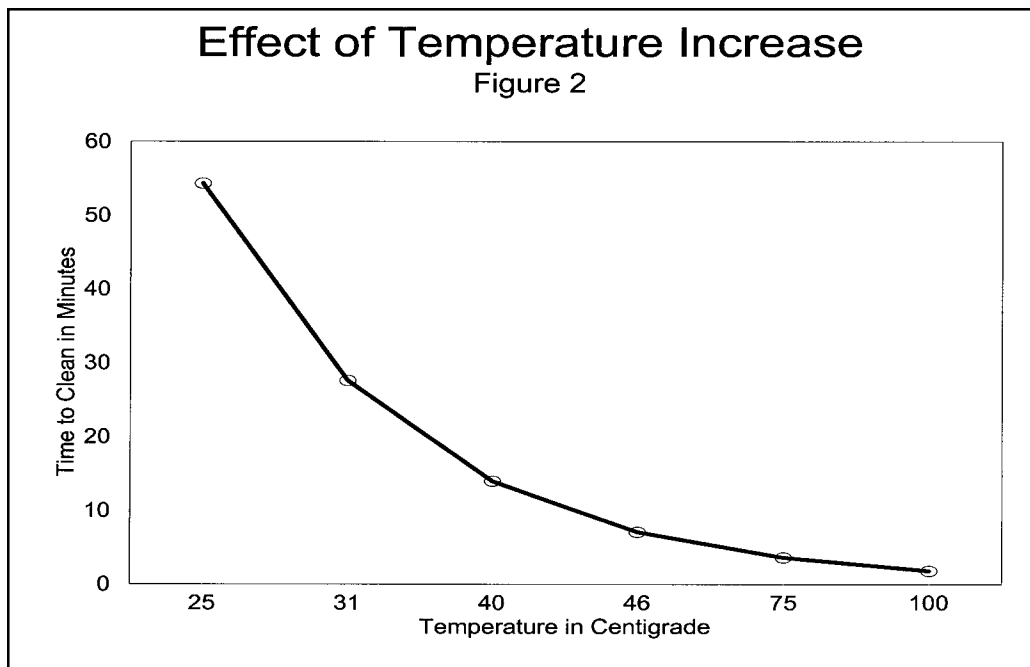
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EFFECT OF TEMPERATURE INCREASE

A. 50% Solution

As the temperature increases in a 50% solution, the cleaning/contaminant removal process is accelerated (Figure 2). Note that a cleaning limit was reached at the 25-second level. At this “equilibrium” or asymptotic cleaning time, the amount of time required for complete cleansing remains fixed and no longer decreases as the temperature is increased to the boiling point.



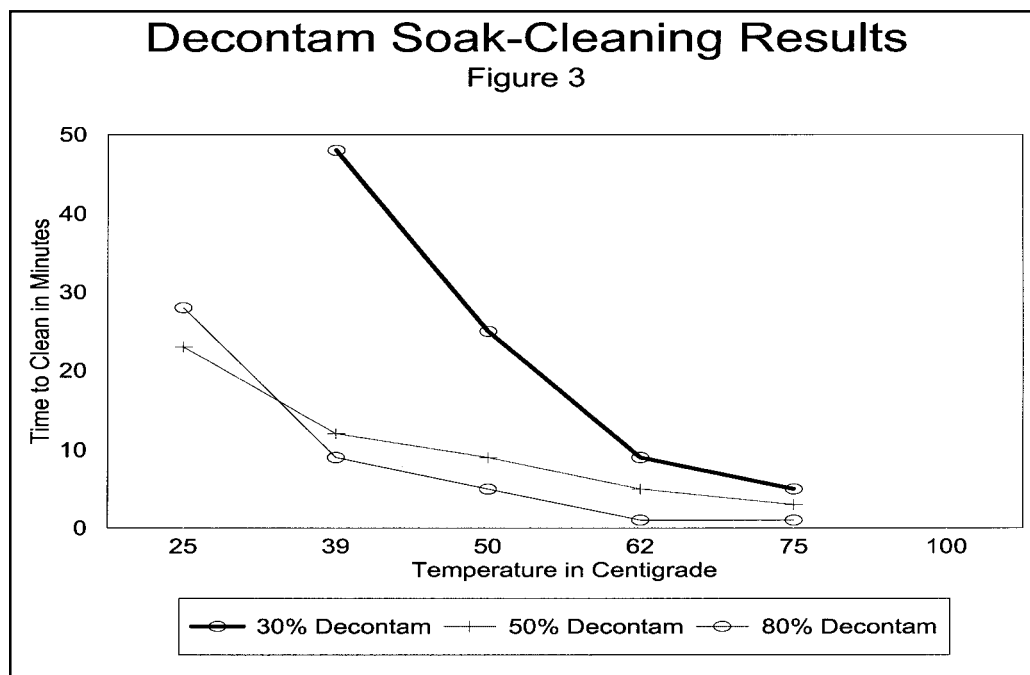
DeContam® Soak-Cleaning
Removal of Silicone Grease from Glass Surfaces

Time to Clean in Minutes vs. Temperature in Centigrade

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B. 30% and 80% Solutions

The test in A. was repeated for concentrations of 30% and 80% to yield the family of curves shown below in Figure 3.



**DeContam® Soak-Cleaning
Removal of Silicone Grease from Glass Surfaces**

Time to Clean in Minutes vs. Temperature in Centigrade

OBSERVATIONS

An anomaly appears at 25 °C, where the 50% solution cleans more rapidly than the 80% solution. This is most likely caused by the effect, in a static soak situation, of the more concentrated surfactant covering the contaminated surface so efficiently that it impairs or hampers the removal of contaminants by other cleaning elements.

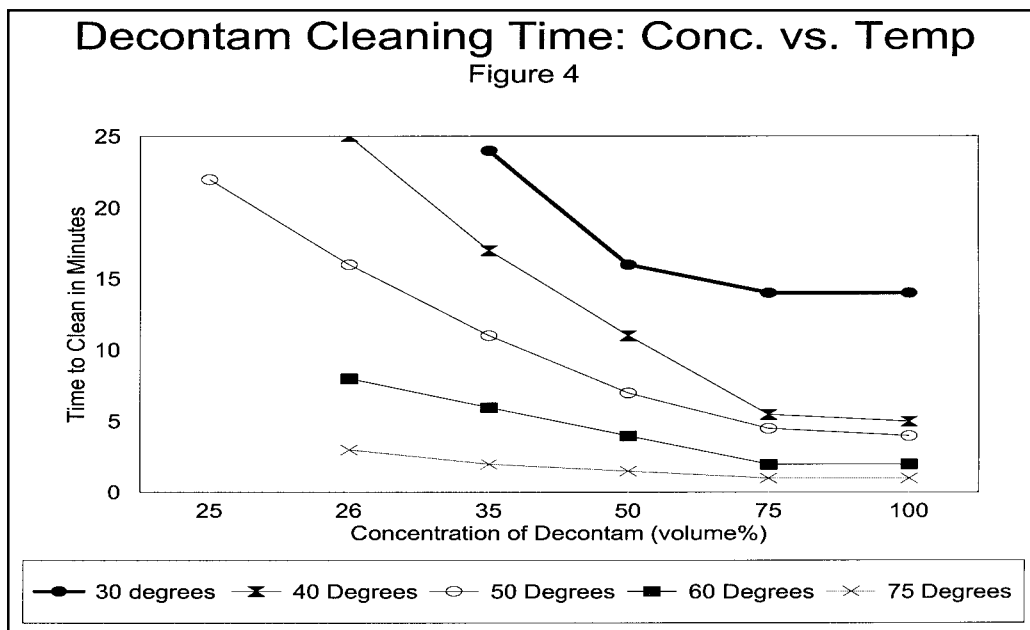
It is further apparent that as temperature is increased, this static-soak phenomenon disappears because of strong agitation of the solution at the surface caused by sharply increased convective flow. This condition, of course, allows the higher concentration of DeContam® to clean more rapidly. Note also, that the 25-second “plateau”, already observed, appears to apply for higher concentration and that a plateau in the 1.5 minute to 2 minute range may exist for the lower concentration of DeContam®.

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SUMMARY DATA CURVES

It is possible, using the test data already discussed, to create a series of “cleaning” curves as shown in Figure 4. The temperature/concentration relationship curves were constructed from the data of Figure 3 by establishing the vertical intercepts at various temperatures.

Figure 4 summarizes the glass degreasing/cleaning ability of all aqueous solutions of DeContam® at various temperatures.



**DeContam® Soak-Cleaning
Removal of Silicone Grease from Glass Surfaces**

**Time to Clean in Minutes vs. Concentration, Volume %
For Various Temperatures**

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