



Working with an Alkaline Cleaning Solution

This procedure describes how to work with an alkaline cleaning solution for removing Support material from printed models.

Safety

The main component of the alkaline cleaning solution is caustic soda. Caustic soda is a very corrosive chemical and requires special care when working with it. Read this safety information carefully before handling this chemical.

1 Protective Clothing

Wear the following protective clothing at all times when working with the alkaline cleaning solution:

- face shield or protective goggles
- full protective suit
- nitrile gloves
- boots or closed shoes



Depending on how you plan to use the alkaline cleaning solution, the suggested protective clothing listed above might not be sufficient. Consult a safety expert before handling the solution.

2 Mixing the Alkaline Cleaning Solution

Always add caustic soda to water. Never add water to caustic soda. Mixing caustic soda with water generates heat that could ignite other materials.

Preparing an Alkaline Cleaning Solution

SUP706 Support material is removed from printed models with an alkaline cleaning solution in a cleaning station. The following instructions refer to cleaning SUP706 using the DT3 CleanStation and the CSIIP CleanStation.

To prepare an alkaline cleaning solution for use in the cleaning station:

1. Make sure that the cleaning station tank is clean. Remove all foreign substances, such as material deposits from previous cleaning jobs.

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2. Fill the cleaning station with water (for the amount, see Table 1 below).

Figure 1: Pouring water into the DT3 CleanStation



The control panel screen turns on when the required amount of water is added to the cleaning station.



Important:

- Before preparing the alkaline cleaning solution, read the Safety section.
- In the following steps, only use chemicals with the indicated CAS number.

3. While the cleaning station is agitating the water:
 - a. Add 2% NaOH (CAS 1310-73-2), according to the quantity shown in the table below.
 - b. Make sure the cleaning station pump is active, and mix the solution for 15 minutes.
 - c. Add 1% Na₂SiO₃ (CAS 6834-92-0), according to the quantity shown in the table below.
 - d. Make sure the cleaning station pump is active, and mix the solution for 15 minutes.

Table 1: Cleaning Stations Volume and Alkaline Solutions Mixture

	DT3	CSIP
Water volume (liters)	20 liters (5 gallons)	60 liters (15 gallons)
2% NaOH (kg)	0.4 kg (0.9 pounds)	1.2 kg (2.6 pounds)
1% Na ₂ SiO ₃ (kg)	0.2 kg (0.45 pounds)	0.6 kg (1.3 pounds)

Figure 2: Adding chemicals



Measuring Cleaning Solution Saturation

The alkaline cleaning solution must be replaced when it reaches saturation level. Stratasys suggests checking the alkaline cleaning solution once a week, depending on use.

Use a hydrometer to determine if the solution needs to be replaced.

Figure 3: Hydrometer



This instrument is used to measure the specific gravity (relative density) of liquids. In this case, it is used to measure the ratio of the density of the liquid to the density of the water.



You can purchase an appropriate hydrometer from Ludwig Schneider.
<http://www.ludwig-schneider.com>

- The hydrometer measurement range must be 1.000-1.100 g/cm³.
- The hydrometer must be at least 28 cm (11") long.



Important:

Before preparing the alkaline cleaning solution, read the Safety section.

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To determine if the alkaline cleaning solution needs to be replaced:

1. Remove all printed models from the cleaning station.
2. Make sure that the temperature of the alkaline cleaning solution is 25°C–32°C (77°F–89.6°F).
3. Agitate the solution in the cleaning station for at least five minutes.
4. Wait until the solution stops moving.
5. Insert the hydrometer into the cleaning station, as shown below.

Figure 4: Inserting the hydrometer into the cleaning station



6. Allow the hydrometer to stabilize and float for ten minutes.
7. Record the number that appears on the hydrometer scale.

Table 2: Support Material Saturation According to Density

Saturation	Density (g/cm ³)
No Support (0%)	1.030 ± 0.002
Medium (10%)	1.040 ± 0.002
Maximum (15%)	1.045 ± 0.002
Ineffective (20%)	1.050 ± 0.002



It is advisable to replace the alkaline cleaning solution when it reaches medium saturation.

Neutralizing the Alkaline Cleaning Solution

When the alkaline cleaning solution reaches saturation point, and before disposing of it, it is recommended to treat it with citric acid to lower its pH level.



Important:

Before neutralizing the alkaline cleaning solution, read the Safety section and make sure to wear protective clothing.

To neutralize the Alkaline Solution:

1. Remove all models from the cleaning station.
2. Activate the cleaning station pump to circulate the solution.
3. Add citric acid (CAS 77-92-9) to the cleaning station tank according to the purity level, as shown in the following table:

Table 3: Amount of Citric Acid According to Purity Level

Purity Level	Support Saturation (Wt. %)	Density	DT3 (20 Liters)	CSIIP (60 Liters)
			Citric Acid Amount (grams)	
99.9%	20	1.050	550	1650
99% (Commercial grade)	20	1.050	690	2070
	15	1.045	710	2130
	10	1.040	740	2220

4. Close the cleaning station cover.
5. Continue circulating the solution for fifteen minutes.
6. Turn off the cleaning station.
7. Wait half an hour until the foam in the tank settles.
8. Drain the cleaning station according to local regulations (see “Disposing of the Alkaline Cleaning Solution” on page 6).
9. Rinse the walls of the tank with half a liter of water.
10. Drain the cleaning station according to local regulations (see “Disposing of the Alkaline Cleaning Solution” on page 6).

Disposing of the Alkaline Cleaning Solution

Stratasys recommends neutralizing the solution to lower its pH level before disposing of it (see “Neutralizing the Alkaline Cleaning Solution” on page 5).

Dispose of the alkaline solution according to local laws and regulations.

It is your responsibility to verify and comply with all regulations governing handling, usage, discharge and disposal of waste generated by your Support material cleaning system (or a Support material cleaning system used on your behalf) and, where necessary, apply and obtain all permits and/or licenses and/or authorization to handle, use, discharge and dispose of such materials.



For detailed information about the chemical composition of alkaline cleaning solution waste, request the Waste Profile Datasheet from your local customer support representative.

