



Nanolab Process Manual



Process 2.2

Heated Water Bath Preparation

1.0 Process Summary

- 1.1 Some chemistry in the Nanolab requires a heated water bath for safety purposes. Specifically, flammable solvents require a water bath to prevent runaway temperatures and situations in which ignition may occur. This process manual describes the operation of the Yamato immersion water baths, which are a significant performance upgrade from hot plate based heating of water baths.

2.0 Material Controls & Compatibility

- 2.1 Under no circumstances is anything other than DI water allowed to be in contact with the Yamato water bath heating array. All chemistries require use of a container placed into the Yamato water bath, which is then heated by the water.

3.0 Applicable Documents

- 3.1 Msink 16/18 Lab Manual
3.2 Chemical Hygiene Plan

4.0 Definitions & Process Terminology

- 4.1 Reaction Container: A vessel in which your chemical reaction is taking place
4.2 Yamato Water Bath: A heated water bath designed specifically for heating a volume of water with a reaction vessel placed into it.

5.0 Safety

- 5.1 Use of acids or bases with the Yamato water baths requires staff review and approval. Hot plates are advised for use with acids or bases where fine temperature control is unnecessary. Acids or bases may react violently with the metal walls of the Yamato bath and damage the bath.
- 5.2 Never over-fill the Yamato water bath. Check your water fill level before heating water or filling your reaction container and make sure that when the dish will not be overtopped by the amount of water in the water bath. Crystallization dishes can displace a surprising volume of water.
- 5.3 Never under-fill the Yamato water bath. Ensure the thermocouple in the water bath is covered at all times, or the temperature can race away and result in an unsafe heating condition.
- 5.4 Always remove the reaction container from the water bath prior to removing or adding anything to the reaction container. This prevents spillage of reaction container contents into the water bath.
- 5.4.1 Always check your container for stability as you place it into the bath. A reaction container will float and destabilize in too-deep water. This can lead to spillage of reaction chemistry into the water-only portion of the system. If this occurs, refer to the troubleshooting procedure on spill cleanup

6.0 Process Data

- 6.1 The water bath takes roughly 15 minutes to achieve a temperature of 80C.

7.0 Process Explanation

- 7.1 The two curved bars in the bath are resistive immersion heaters. These are in direct contact with and heat the water. They are coated in a corrosion resistant material suitable for contact with **water only**.
- 7.2 Unlike hot plates, Yamato water baths do not require members to set the temperature above the desired temperature of the water. Always set your process to be controlled to your desired temperature. The bath has an immersed thermocouple that will ensure the water actually reaches the desired temperature.

8.0 Process Procedure

- 8.1 Write out a process ID label (See Lab Manual Chapter 1.1 - Chemical Hygiene Plan)
- 8.2 Tape label to water bath.
- 8.3 Fill water bath to above the thermocouple and check that your container will not overtop when placed in the bath.
 - 8.3.1 Aspirate any excess water, or add water if the thermocouple is not covered.
- 8.4 Take orange thermocouple from wall and plug into msink thermocouple jack.
- 8.5 Clip thermocouple into metal clips at lip of bath, slide thermocouple until submerged in water. You can now read temperature of water directly from msink thermocouple readout.
- 8.6 Set water bath to temperature using dial
- 8.7 Set up desired chemistry in reaction container
- 8.8 Place reaction container into Yamato bath.
 - 8.8.1 Make sure reaction container is stable. In the event of a spill, refer to the troubleshooting section on handling spills in the Yamato bath.
- 8.9 Heat for desired amount of time. Check process regularly. Consult with process staff to determine frequency of checks.
 - 8.9.1 Do not overfill the bath to avoid coming back to check on your process. Doing so can lead to spillover or container instability.
- 8.10 Remove container from Yamato bath
- 8.11 Turn off Yamato bath
- 8.12 Secure container and clean up workspace area.
- 8.13 Aspirate water in Yamato Bath until the aspirator is ineffective. Remaining water will evaporate.
 - 8.13.1 **Do not wipe out the bath. Doing so can burn you if the heaters are still hot.**

9.0 Troubleshooting Guidelines

- 9.1 In the event of a spill:
 - 9.1.1 Assess the situation – Is the container safe to interact with?
 - 9.1.1.1 In the event of a violent reaction, clear the area and notify staff immediately.
 - 9.1.1.2 In all other cases, follow procedure below
 - 9.1.2 Immediately remove the reaction container using appropriate chemically inert tools.

- 9.1.2.1 Never immerse your hand in a chemically active or chemically contaminated bath – **use Teflon or metal tools as appropriate to your chemistry.**
- 9.1.3 Determine if the solution can be aspirated according to the CHP.
 - 9.1.3.1 If the solution can be aspirated, do so.
 - 9.1.3.2 If the solution cannot be aspirated, bring bath to side of central general sink.
 - 9.1.3.3 Obtain crystallization dish or other suitable container for contents.
 - 9.1.3.4 Open drain plug and drain into container. Use DI water gun to rinse walls of the bath and remove all chemistry.
 - 9.1.3.5 Dispose of waste into proper waste bottle, filling out blue waste log sheet as appropriate.
 - 9.1.3.6 Enter a fault for appropriate msink (16 or 18) to notify staff that bath needs to be inspected for contaminants.

10.0 Figures & Schematics

10.1 N/A