NEMO Name: Coldplate-Solvent

Location: Liftoff-L10 Hood
Purpose: Cold development of small samples and pieces
Contact: Juan Ferrera

Contents

Introduction **1**

Safety **2**

User Qualifications and Responsibilities **2**

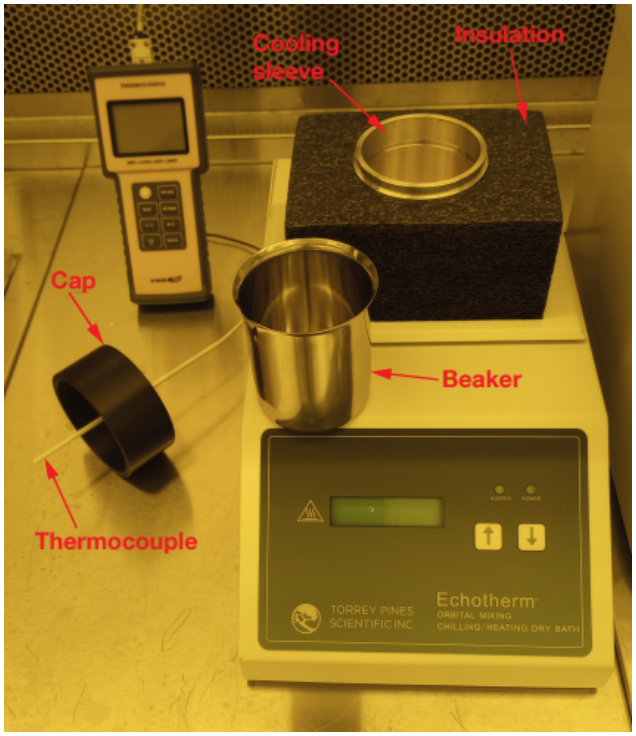
Operating Procedures **3**

Appendices **4**
A. Thermal Performance 4
B. New Developer Thermometer 5

Introduction

The Torrey Pines thermoelectric chilling plate is set up for cold development of small samples. It reaches a temperature of 0°C in 30 minutes, -5°C in 45 minutes, and has a minimum temperature of approx. -12°C.

The main parts of the cold plate setup are shown on the right.



- The solution sits in a stainless steel beaker.
- There is a cooling sleeve to provide good thermal contact between the beaker and the cold plate.
- The sleeve is surrounded by a thermal insulating block.
- A cap sits atop the sleeve and provides further thermal insulation.
- The cap has a hole, through which a thermocouple probe can be inserted to measure the temperature of the solution.

Safety

- For solvent processing only. Appropriate PPE for solvent work must be worn: white nitrile gloves, safety glasses.
- All procedures for hood Liftoff-L10 must be observed.
- All procedures for solvent processing must be observed.
- Developer solutions and associated hazards:

  IPA/MiBK 3:1
  H225 Highly flammable liquid and vapor.
  H319 Causes serious eye irritation.
  H335-H336 May cause respiratory irritation. May cause drowsiness or dizziness.

  o-Xylene
  H226 Flammable liquid and vapor.
  H304 May be fatal if swallowed and enters airways.
  H312 + H332 Harmful in contact with skin or if inhaled.
  H315 Causes skin irritation.
  H319 Causes serious eye irritation.
  H335 May cause respiratory irritation.
  H401 Toxic to aquatic life.
  H412 Harmful to aquatic life with long lasting effects.

- Do not pour solution directly into the cooling sleeve, it does not hold liquid.
- Use caution when pouring the chemical into the beaker. Wipe any minor spills immediately. Call ERT for a major spill.

User Qualifications and Responsibilities

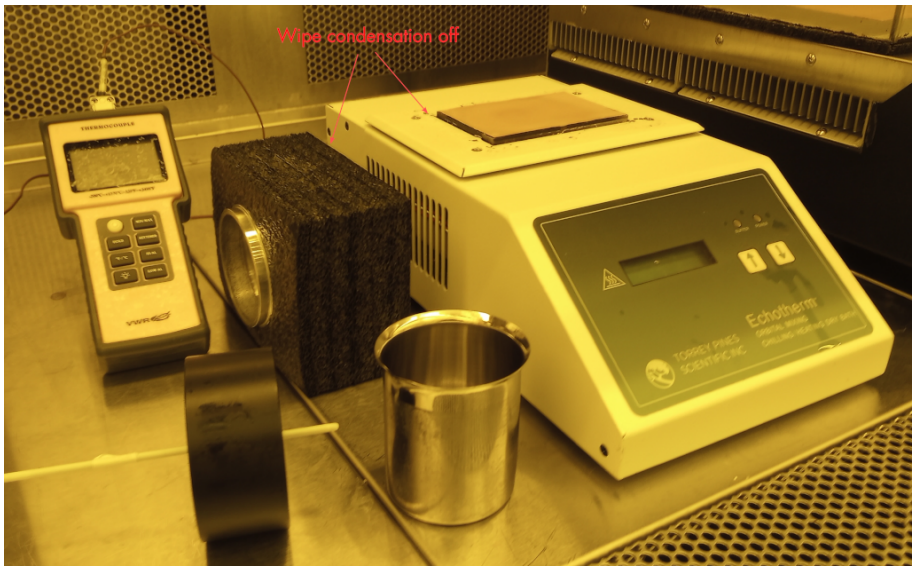
- User must be qualified for wet chemical processing.
- Used or spent solvent developer waste must be collected locally in the 4 L solvent waste container. Check waste level before adding and change out waste container if ¾ full. Be sure to secure and fully close the funnel lid after adding the waste.
- When work is complete, turn off power to the coldplate. Clean up hood.
- Rinse and dry select parts as described in the operating procedures.

Operating Procedures

1. Engage in NEMO.
2. Place sleeve adaptor plate on top of the cooling plate. Press firmly to get good thermal contact.
3. Pour solvent developer (IPA/MiBK or o-Xylene) solution into the stainless steel beaker.
4. Slide beaker into the cooling sleeve. CAUTION: Do not pour solution directly into the sleeve. It does not hold liquids and you will make a big mess.
5. Place the cap on top of the cooling sleeve and insert thermocouple into the solution.
6. Turn on thermocouple readout.
7. Turn cold plate on. The switch is at the rear, on the right.
8. The cold plate has two setpoints: temperature and orbital mixing speed. To switch between setpoints, press both arrows simultaneously. Use orbital speed 1 to 4.



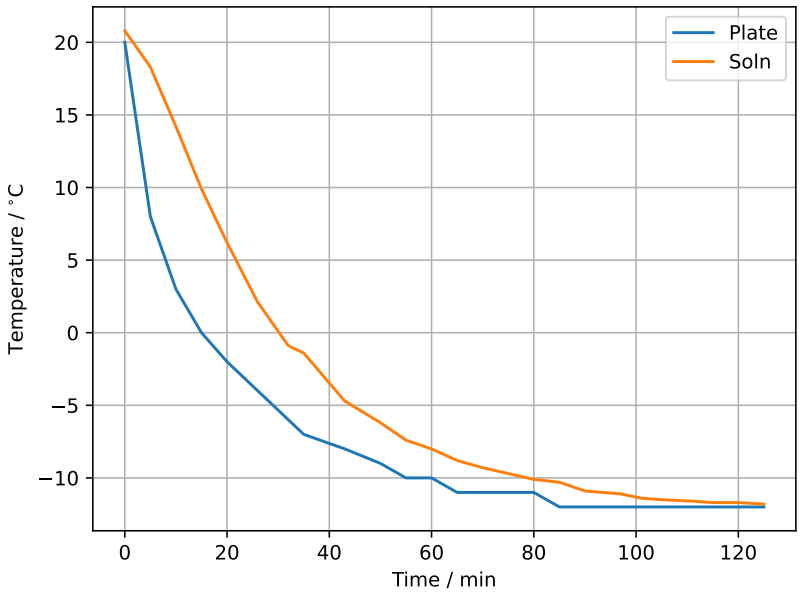
9. When desired temperature is reached, remove cap with thermocouple, and set aside.
10. Develop sample(s).
11. Turn off cold plate and thermocouple readout.
12. Slide beaker out and pour developer into solvent waste container. Be careful not to spill developer onto the cooling sleeve or the thermal insulation.
13. Rinse beaker, thermocouple and cap with isopropanol. Place them at the back of the hood to dry.
14. Remove the sleeve adaptor plate and wipe condensation from the bottom of the adapter and the cold plate. (see photo below)
15. Disengage in NEMO.



Appendices

A. Thermal Performance

The following data are from a sample run, cooling down 150 ml of isopropanol.



B. New Developer Thermometer

A new, more accurate thermometer for the measurement of the developer temperature has been installed. It is a platinum resistance thermometer, also known as a “resistance temperature detector” (RTD). It’s accurate to 0.1°C for temperatures between -20°C and 20°C. The following table relates temperature readings with the old thermocouple thermometer to the temperature measured with the new RTD. Notice that below 0°C the differences become significant. Use the RTD readings as setpoints for your development process.

TC temp. / °C	RTD temp. / °C
-10.0	-10.5
-9.0	-9.5
-8.0	-8.4
-7.0	-7.4
-6.0	-6.4
-5.0	-5.4
-4.0	-4.4
-3.0	-3.2
-2.0	-2.0
-1.0	-0.8
0.0	0.3
1.0	1.3
2.0	2.2
3.0	3.2
4.0	4.2
5.0	5.1
6.0	6.0
7.0	7.0
8.0	7.9
9.0	8.9
10.0	9.8
11.0	10.8
12.0	11.8
13.0	12.9
14.0	13.9
15.0	14.9
16.0	16.0
17.0	16.9
18.0	17.9
19.0	18.9
20.0	19.8