De Dietrich Glass Lined Reactor: Standard Operating Procedure

Robert Cox 7-2017

All students must meet with the lab manager to review the operation procedure prior to operating this equipment.

Safety
- All students must wear safety glasses when working in the lab
- Never leave this equipment operating unattended
- Mix all chemicals in a fume hood
- All chemicals, solutions and standards must be stored in a sealed container. The container must be labeled with: the chemical(s) name and concentration, the user name or group name.
- All chemical containers must be sealed when not in use.
- All unwanted material must be placed in a Nalgene container. The container must be labeled “Unwanted Material” the label must include; the chemical(s) name and concentration, the user name or group name.

Overview and equipment description

A typical experiment using the glass lined reactor would be to mix two reactants and study aspects of the reaction such as residence time, pH, or conductivity.

Two or more reactants can be introduced into the reactor via the feed ports as shown below.

Reactance may be pumped into the reactor using peristaltic pumps. Reactor feed stock may be mixed and stored in the large Nalgene containers.
All containers must be clearly labeled with: material name, material concentration and group name.
Containers must be covered when not in use.

The reactance may be fed through the rotameters and valve system mounted on the acrylic panel located next to the reactor. This system facilitates mixing and flow control.

The Glass Lined Reactor can be heated with steam or cooled with water.
The main steam and water valves are shown at left. Do not adjust these valve. They are always open unless the equipment is being serviced.
Sight Port
Remove cap to view interior of reactor.

Conductivity Probe and Product Outlet Tube

Main Power Breaker for Mixer Do Not Adjust

Mixer Start and Stop Control
The reactor is typically operated at atmospheric pressure.

Consult the lab manager prior to operating the reactor under pressure as special precautions must be taken.

The reactor incorporates a mixer mounted at the top of the reactor. Rotational velocity of the mixer may be adjusted using the speed control shown below. Mixer speed is read using a hand held digital tachometer available in the stock room.

Reactor specifications:
Reactor specifications are engraved on tags located on the side of the reactor. The volume of the reactor is listed a 5 gallons nominal.
Operating Guidelines

1. Determine the amount of reactants you will need for your experiment. Mix your reactants according to safe lab procedures. Contact the lab manager if you have questions regarding proper handling and or labeling of chemicals. The reactor is typically operated in batch mode.

2. The conductivity of the product stream may be measured using the in-line conductivity probe. The data from the conductivity probe is displayed on the desktop and logged to the computer. The probe is currently calibrated for a range of 2.500 – 15,000 microsiemens. The range of the conductivity probe may be adjusted to the following ranges: 500-2500, 2500-15000, 15000-100,000 or 100,000-1,000,000 microsiemens. Be sure to determine the range of conductivity you wish to measure prior to running your experiment. Consult the lab manager if you would like to calibrate or adjust the range of the conductivity probe.

3. Log onto the computer. The password is Password. The computer is not on the network.

4. Start the Opto Control program by double-clicking the Glass Lined Reactor icon located on the desktop.

5. Check out Digital Laser Tachometer from stock room.

6. Confirm that the main power breaker is in the on position.

7. Verify air pressure regulator is set to 15-25 PSI.

8. Verify bottom sample valve is closed.

9. Open steam or water valves as needed.

10. DO NOT OPEN THE STEAM AND WATER VALVES AT THE SAME TIME!

11. Verify steam trap valve and bypass valves are set appropriately.

12. Configure the feed system, peristaltic pumps, valves etc., as required.

13. Pump your solutions into the reactor vessel.

14. Samples may be taken from the bottom of the reactor using the sample valve.

15. Use caution when taking samples as your solution may be hot and / or hazardous.

16. The speed is read by pointing the digital laser tachometer at the reflective tape on the mixer shaft. The tachometer will display the number of rotations per minute.
Shut Down Procedure.
1. Turn off mixer.
2. Exit the Opto program.
3. Do NOT shut down the computer.
4. Close steam inlet ball valve not the main steam valve.
5. Close water feed valve.
7. Open the steam trap valve and the steam trap bypass valve.
8. Empty and clean feed tanks and pumps.
9. Return tachometer to stock room.
10. Save your data to a flash drive.

Viewing and Saving the Data
1. Once you have exited the Opto program, open Excel
2. In Excel go to: Open, then navigate to the data folder, C:\DATA Glass Lined Reactor. In the bottom of the Excel window click on the drop-down window and select All Files, the data files should now be displayed. The data files are organized by date.
3. Double-click on the file you wish to open. The Text Import Wizard will open. Select delimited and then click Next, then select Comma delimited, select Next, select the General data format option and then select Finish. The data should now be displayed in Excel.
4. Save this data to a flash drive after each lab. The computer is not on the network.