

Procedures for using a direct-drive vacuum pump GLADYSZ Research Group

1. It is **UNnecessary** to run the oil pump 24 h every day. Particularly the oil pumps under the small hoods suffer from limited air cooling in the chamber and therefore they run too hot. This presumably contributed to mechanical problems in some cases. The only exception is when you run the pump with very dirty oil (which you shouldn't). In this case turning off the pump might cause the oil to solidify as it cools, and the pump might not start again.
2. Use a minimum of one cold trap to trap condensable vapors (preferably a dual-trap system). Use an additional cold trap for distillations or removing solvent. If you are working with acids, protect your pump with a base trap (this could be a tube filled with KOH pellets).
3. Ensure there's enough liquid nitrogen in the cold trap whenever operating your vacuum pump. Liquid nitrogen should always be used even if no solvent is evaporated through the line. The quality of the vacuum is usually better as well. For running the oil pump overnight, use the blue Isotherm Dewars; only these keep the liquid nitrogen for several hours. For a better insulation, cover the top of the Dewar with a cloth or paper towels. Drying of samples for elemental analysis can be done overnight without using a cold trap (if the sample is already quite dry).
4. Clean your cold trap at the end of each day's use to prevent accidental ingestion of vapors by the pump. It is recommended to open the cold trap after use in any case.
5. If liquids are ingested directly into the pump's oil case, drain the oil, and replace it with a fresh supply. Absolutely avoid ingestions of solids such as silica gel, which will certainly destroy your pump!
6. Keep oil level at the full mark.
7. Use the gas ballast occasionally (once a month) or every time you suspect that any amounts of solvent vapors might have been sucked into the pump (e.g. upon removals of large amounts of solvents, extended periods of sample drying, etc.). The gas ballast is located at the top of the pump next to the inlet. You may open the gas ballast by unscrewing the nob (there is an O-ring which keeps it airtight) and letting the pump run for a couple of hours. You should do this also after every oil change. Be aware that using the gas ballast uses a lot more oil than regular operation (keep an eye on the oil level).
8. Proactively change the oil of your vacuum pump (about every six months or as needed). Oil changes should be more often if you are regularly using volatile amines or other corrosive chemicals. If the oil pump will be shut down every day and the using conditions are normal, the oil change intervals can be extended accordingly. A good indication is any color change of the oil, which should be periodically monitored.
9. Keep a record of oil changes attached to the pump.
10. When changing the oil, lift the back of the pump a few times to make sure all of the oil drains. Fill the pump with flushing oil and run for 15-30 minutes. Drain the flushing oil. Repeat the process with the flushing oil until it comes out clean. Refill the pump with the appropriate regular oil for direct-drive pumps.

11. Check the quality of the vacuum on regular base; either by a permanent installed gauge (strongly recommended) or by regular measurements with an external gauge.
12. If there's a problem with your pump (bad vacuum after checking all connections, weird noises,...) tell the person in charge (duty list!). If it needs to be repaired, attach a note with your name, email address, and a short description of the problem to the pump. Don't just get a new pump from the stockroom and leave the broken one there!
13. Install your pump in a well-ventilated area or else it might overheat, and its lifetime will be shortened.

SAFETY HAZARDS:

1. Be aware that a bad vacuum or sucking in lots of air (never use your pump for filtrations or aspiration with air) can cause condensation of oxygen into your cold trap. Liquid oxygen can lead to explosions and is a strong oxidizer. Liquid oxygen is a light blue liquid. If you see this in your cold trap, let it evaporate slowly (don't remove the Dewar) and alert your lab mates of the potential danger.
2. It is highly recommended to vent the pump exhaust fumes into the hood. Even with a cold trap, there is a danger of hazardous fumes exiting the pump. Consider setting up your pump inside a fume hood.