CBR
UBC Centre for Blood Research

CBR Fermenter Suite
Frequently asked questions: Updated Jun 2011

What kind of fermentation equipment is available?

Our suite has

		Pichia Station				Bacterial Station		
		F1	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**
	Vessel size allowed	3-L or 7-L	3-L or 7-L	3-L or 7-L	70-L	3-L or 7-L	3-L or 7-L	3-L or 7-L
	(Minimal Working volume)	(1-L or 5-L)	(1-L or 5-L)	(1-L or 5-L)	(1-L or 5-L)	(1-L or 5-L)	(1-L or 5-L)	(1-L or 5-L)
	MeOH sensors	Yes	Yes	Yes	No	No	No	No
Fermentations	Bacterial	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Pichia	Yes	Yes	Yes	Yes	No	No	No
	Insect/Animal	Yes	Yes	Yes	No	Yes	Yes	Yes

				For
Number of fermenters	3-L	Rushton impeller	x 3	Bacterial or *Pichia*
	3-L	Marine impeller	x 1	Insect or Animal
	7-L	Rushton impeller	x 3	Bacterial or *Pichia*
	70-L	Rushiton impeller	X 3	Bacterial or *Pichia*

- *Pichia* fermentation System (F1, F2, and F3) -

Applikon, three (3L or 7L) vessels installed with methanol sensors. Priority of these vessels are for *Pichia* fermentation, however, these can be used for others (Bacterial or Insect/Animal cells) as well.

- 70-L Fermentation Pilot System (F4) –

Applikon, one 70-L vessel for either Bacterial or *Pichia* fermentation.

- Bacterial fermentation System (F5, F6, and F7) -

Applikon, three (3L or 7L) vessels. For mainly Bacterial fermentations.

		controllers		For
Temperature	Temp probe	HJ/Water	x 8	Bacterial or *Pichia* or Insect/Animal
pH	pH probe	Base/Acid	x 8	Bacterial or *Pichia* or Insect/Animal
Dissolved Oxygen (DO)	DO probe	Air, O2, rpm/N2	x 8	Bacterial or *Pichia* or Insect/Animal
MeOH	MeOH sensor	MeOH	x 3	*Pichia*
OD (cell growth)	OD probe	None	x 3	Bacterial or *Pichia*

All 7 fermenters are equipped with its own controller (Applikon, ADI1010 biocontroller), stirrer controller (ADI 1032), 3 rotameters for 3 different gases (O2, N2, and air), motor, pH sensor, dO2 sensor, temperature sensor, heating jacket, and 3 pumps (acid, base, and antifoam/label). Water/drain system and centralized gas station (N2, O2, and air) provide cooling water and gas to individual fermenters in need. For *Pichia* fermentation, additional two pumps (one for methanol and one for nutrient) are provided together with methanol sensor and methanol controller box.

Please see ***Floor Plan*** from the Equipment page to see floor plan of our suite.

I'm the first time user. How do I start?

Please contact the suite manager either by visit or e-mail.

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Centre for Blood Research
Life Science Building
Rm4302 (Office) Rm4332 (Lab)
Sunghye.grieco@ubc.ca
604-827-4356 (Office Tel)

You must provide information about brief summary of fermentation you would like to do.

First time users will be charged with first time training fee (Please see the ***Fee Schedule***) and will get all assistant from the suite manager.

Who is conducting fermentation?

Our fermentation suite is self-conducting facility, where users can do their fermentation by themselves with their own schedule. All the users must take first time training from suite manager regardless whether users have experiments in other fermentation environment or not. Manager supervises all the fermentation process in the suite including planning, conducting, discussion, and summarizing/delivering results. It is highly recommend discussing about your

project before the fermentation in order to get satisfying results. Also, it is required to provide all information about fermentation to complete data recording.

Do I have free access to the facility if I used it before?

No. You still need to contact manager and confirm the availabilities of fermenters. During fermentation experiments, the user(s) might receive an access key for measurement of cell growth or sampling. However, you can view the scheduled fermentation from our website main page on the bottom www.cbr.ubc.ca/fermenter.htm

How long does fermentation take from the beginning to the end?

It is not that different from regular flask cultures. Only time you might have to consider is time to assemble bioreactors (30-1 hr) before sterilization and installation time after autoclave (about 1 hr, depends on skills and settings). However, it is recommended to assemble and sterilize bioreactors the day before start fermentation because dO2 probe requires polarization (6 – 12 hrs) after sterilized for its best performance.

What is included in the service fee?

Provided

Basic lab wear	Beakers 500 ml and 1 liter
	Additional nutrient bottles
pH adjustment	Acid: HCl (If you wish to use other types of Acid such as Acetic Acid, you should provide it)
	Base: ammonium hudroxide, NH4OH
	pH standard solutions, 4 and 7
	pH sensor storage solution (saturated 4M KCl)
Assembly of bioreactors	Air Filters
	Aluminum foil
	Cheesecloth
	Clamping for clipping tubing
	Luer fitting connectors (male and female)
	Plastic ties and tie guns
	Silicon tubing
Sterilization (small vessels)	Autoclave (Rm 4.345 in CBR west wing)
	Autoclave gloves
	Sterilization tape
	Sterilization tray
Sterilization (70-L)	In-suite steam generator
Inoculation	Anti-foam 204 (from sigma)
	Funnel to pour media
	Needle (G No. 19)
	Syringes (1ml, 10 ml, or 60 ml) with luer fitting, individually sealed and

	sterilized
	Rubber septa
	Tubes (15 ml and 50 ml) for sampling, sterilized
	Tube racks for 15ml and 50 ml tubes
Gas	O2 (medical grade), N2 (medical grade), and compressed air (from building) or medical grade compressed air for methanol sensors.
	Regulator and individual rotameter with different flow rate
	Peek tubing
	Teflon tapes
	Tools
Decontamination	Alcohol Prep Pad
	Antibacterial soap
	Biohazard bags
	Bleach
	Brushes and sponge
	Detergent
	Ethanol
	Kimwipes
	Paper towel
	Sharp containers
OD measurement	Plastic Cuvettes (1.5 ml)
Others	Carts for bioreactors (CBR reception area)
	Gas cylinder dolly (CBR reception area)

What is NOT included in the service fee (should be prepared by users)?

NOT Provided

Basic lab wear	Cart (personal cart to brings sample to the suite and bring back to own lab)
	Glove of your size (only extra small is prepared in the suite)
	Lab coat (it is mandatory)
	Pens or markers
	Pipette man and tips
	Safety glasses (it is mandatory when dealing with acid, base, and other equipment)
Sample and media	Antibiotics
	Ice and ice boxes (ice can be obtained from autoclave room 4.345 in west wing)
	Media (LB, TB, etc)
	MilliQ water
	Sample (inoculum)
Harvest	Media bottle
	Any extra bottles (waste for feed-batch experiments etc.)
Others	Extra pumps, bottles, containers for special setting

How do I retrieve fermentation data after fermentation?

Receiving well-organized data is important part of the service. From Jun 2008, our suite started on-line **fermentation database** system which allowed to search and download detail result and invoice with password. Please see detail about is from our main page or technical references page.

Is suite saving all the fermentation data even though it is a long time ago? Is it possible to track down some of old data conduced by old lab member in order to resume old project?

Our suite has both electric version and hard copy of all fermentation data conducted in this suite since the beginning of the service (Sept 2006). It can be tracked down by two different methods. One is **project number** and the other one is **experiment number**.

Project number usually starts with the first four letter of PI name and followed by one letter and number and followed by fermenter numbers being used; for instance "Brom A1 (F#)". If fermentation is repeated with the same target and in the same host, it will have same project name with consecutive numbers and followed by fermenter numbers used, such as "Brom A2 (F#)", "Brom A3 (F#)" … If fermentation is done with different target or in different organism but from same lab, it will start with same PI name but different letter and different number.. Brom B1 (F#), Brom C1 (F#) …

Experiment number starts with number of year (last two digits), month (two digits) and date (two digits) and bioreactor numbers (F1, F2 …) with slash symbols between them; for instance "07/06/25/F4" for 2007 June 25th Fermenter #4. Date is the day fermentation started (inoculation date). One project might have than one experiment numbers if more than one bioreactor is used.

All the data is saved in our fermentation data base. It is accessible with lab-specific password. However, a few successful examples are open to public with PI's approval. Please visit the Technical References page for detail.

Is there any other equipment available to harvest cells or break cells?

We also have

- Pre-culture-

1) **New Brinswick Innova Shakers** in 37C room in CBR (located in Room 4330) for pre-culture in flasks.
2) **Labnet Incubator/Shaker** exclusively for *Pichia* starter culture or plate.

- Cell growth measurement-

3) **DASGIP OD module** with 3 probes to measure real-time OD during fermentation process.
4) **Perkin-Elmer Lamda 4B UV/VIS spectrometer** (located in Burnick lab, Rm 4320 22/23) for OD measurement.
5) **Fisher mini centrifuge and Ohaus Scout® Pro SPx601 balance** to measure cell mass (0.1 g – 600.0 g)

- Harvest-

6) **CEPA® Z-41 High-Speed Separator** for harvesting large culture (70-L fermentater) sample.

- Cell disruption -

7) **Avestin EmulsiFlex-C5 high pressure homogenizer** for breaking *E.coli* cells.
8) **Typ KDL® Dyno-Mill** for disintegrating yeast cells.
9) **VWR 600® Hot plate** for drying glass bead for the Dyno-Mill.
10) **BioSpec Product Inc ® BeadBeater** for disrupting yeast cells.

Using of Labnet Incubator/Shaker, DASGIP OD module, CEPA Z-41 high speed separator, Avestin EmulsiFlex-C5, Typ KDL Dyno-Mill, and BioSpec Product BeadBeater is charged with ***Fee Schedule*** at the Service page.

Can I book the fermenter for special settings (may not be able to share with other users) that require long periods of time?

Academic research groups at UBC are welcome to use our fermenters with minor modification if necessary. However, some experiments might require installation of special parts which might be difficult to share with other users. If fermenters are available, you might occupy fermenter(s) weekly (possibly longer than that) with special setting installed. However, fees will apply daily bases regardless whether actual fermentations were being conducted or not.

Is there a training course (workshops) available to learn about the fermentation process and have hands-on experience with operating bioreactors, optimization, and analysis of fermentation results?

We have two annual workshops currently. One is *Pichia* workshop (8 days duration) teaches you a basic theory and hands-on experience about *Pichia* fermentation. Also, we have a process optimization workshop which utilizes a statistical tool called Design of Experiment (DOE). Please see our ***Workshop*** page from our website for detail information. Any question regarding workshops and seminars would be sent to suite manager.

How do I acknowledge your facility in my publication? (Communication requirement)

We thank our clients for acknowledging our facility in publications:

There are two ways of doing this. Either you can mention us in the Acknowledgement or in the Method section of your publication.

"(Your target) was produced by fermentation provided by ***UBC Centre for Blood Research Fermentation Suite***." Or

"The author thanks ***UBC Centre for Blood Research Fermentation Suite*** for providing fermentation equipment to produce (your target)"

The users who acknowledged us in the publication will receive 5% discount for a full years for all the use of all the equipment from our facility.
