



Vivacell 100

Technical data and operating instructions.
For in vitro use only.

Vivascience Vivacell 100

Vivacell 100 is a disposable ultrafiltration device for the concentration and desalting of aqueous biological solutions. Vivacell 100 can be used in swing bucket centrifuges accommodating 250 ml bottles, or as a gas pressurised assembly for use on a laboratory shaker.

The innovative design, (US Pat No. 5,647,990, WO 98-26859), solves the problems associated with traditional stirred cells whilst adding extra performance and flexibility. Vivacell 100 requires no tubing connections or stirring mechanisms and cannot be concentrated to dryness.



Centrifugal Operation

Vivacell 100 can be used in any centrifuge with a swing out rotor accepting 250 ml centrifuge bottles. Samples can typically be concentrated in 25-30 minutes. For large volumes and multiple samples, four or more units may be used.

Pressurised Bench Top Operation

Vivacell 100 can be pressurised and left to concentrate standing on a bench top. Where processing at reduced temperature is required, Vivacell 100 can be pressurised, then placed in a refrigerator.

Pressurised Operation on a Laboratory Shaker

For faster filtration, the Vivacell 100 concentrator can be pressurised and placed on an orbital shaker. This reduces membrane fouling while keeping shearing forces, usually associated with stirred cells, to a minimum.

Equipment Required

A. For use with Centrifuge

1. Centrifuge with swing bucket rotor accepting 250 ml centrifuge bottles.
2. Pipettes for sample recovery.

B. For use with Gas Pressure

1. Vivacell 100 pressure head (Product No.VCA800)
2. Vivascience Air Pressure Controller (APC) (Product No. VCA002) or equivalent pressure regulator.
3. Pipettes for sample recovery.

Optional Equipment

Laboratory orbital shaker accepting 250 ml bottles.

Operation

1. Select the most appropriate membrane cut-off for your sample. For maximum recovery select a MWCO at least 50% smaller than the molecular weight of your target molecule.

A. Centrifuge

2. In swing bucket rotors fill with 20-90 ml of sample solution.
Seal with polypropylene cap provided.

3. Insert concentrator into centrifuge.

WARNING: Always use two devices opposite each other and counterbalanced with the same medium to prevent centrifuge imbalance.

4. Spin at up to 4,000g (see Table 1 for recommended spin speeds).
5. Once the desired concentration is achieved (see table 3 for guide on concentration times), remove assembly and recover sample from the bottom of the concentrate pocket with a pipette.



B. Using Gas Pressure

2. Fill with 20-98 ml of sample solution. Close with santoprene seal in place of polypropylene cap.

3. Attach pressure head, (Product No. VCA800), to concentrator assembly and hand tighten to ensure an airtight seal.

- 4a. Set APC regulator to desired pressure (a pressure release valve factory set at 5bar does not allow operation above this pressure). Lift regulator knob to unlock and turn in the appropriate direction (see table 1 for recommended pressures). Attach assembly to the female connector to charge the pressure head. Detach from connector, by raising the outer locking sheath.

One charge is normally sufficient to fully concentrate the sample.

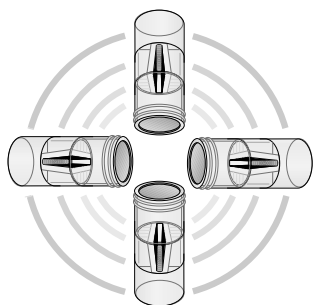
- 4b. It is possible to use the concentrator assembly under constant pressure, by using the extension line from the APC.

5. Leave to concentrate. For faster processing place on laboratory shaker and agitate gently at approximately 200-300 rpm.

Avoid high speed shaking, as this is unnecessary and can cause foaming.

6. Once desired concentration level has been reached (see table 3 for guide on concentration times) remove assembly and de-pressurise by unscrewing pressure head or by releasing air from the centre of the inlet valve with a pointed instrument.
7. For maximum recovery, allow to stand after de-pressurisation for 10-15 minutes and then extract concentrate using a Pasteur or fixed volume pipette.

Centrifuge



Pressurise



Pressure Shake

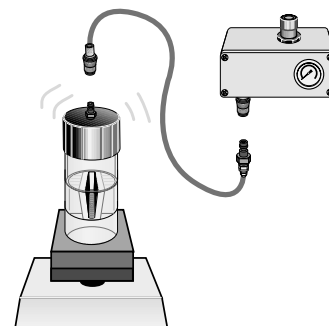


Table 1: Recommended operating conditions

Mode	Centrifugal (x g)			Pressure (bar)		
	min.	typical	max.	min.	typical	max.
5-100,000 MWCO PES	500	3,000	4,000	2	4	5
300,000 MWCO PES	500	2,000	4,000	1	2	5
1,000,000 MWCO PES	500	1,000	4,000	0.5	1	5

Usage Tips

1. Flow Rate

Filtration rate is affected by several parameters, including membrane cut-off, sample concentration, viscosity, centrifugal force, pressure and temperature. Expect significantly longer spin times for starting solutions with over 5 % solids. When operating at 4° C. flow rates are approximately 1.5 times slower than at 25° C. Viscous solutions such as 50 % glycerine will take up to 5 times longer to concentrate than samples in a predominantly buffer solution.

2. Prerinsing

Membranes fitted to Vivacell concentrators contain trace amounts of Glycerine. Should this interfere with analysis this can be removed by rinsing approximately 50 ml of buffer solution or deionised water through the concentrator. Decant filtrate and concentrate before processing sample solution.

3. Sterilisation

Vivacell concentrators are not autoclaveable. To sterilise, use a 70 % ethanol solution or sterilising gas mixture.

4. Desalting or Solvent exchange

The sample is first concentrated to desired level. Filtrate is discarded, then the device is refilled with an appropriate solvent. The sample is concentrated again and the process repeated until the concentration of the contaminating microsolute is sufficiently reduced. Typically three wash cycles will remove 99 % of initial salt content.

5. Cleaning and sanitising

Vivacell concentrators may be used several times if recommended cleaning and storage instructions are adhered to, and the membrane is not allowed to dry.

- I. Rinse out the device several times with deionized water.
- II. Fill the concentrator with a solution of 60 % Ethanol and 40 % 1M HCl. Alternatively fill concentrator with a dilute non ionic surfactant.

Place the device in filtrate bottle and allow to soak for 1-2 hours. For best results, agitate on a laboratory shaker for approximately 30 min.



WARNING: *Strong alkaline solutions should not be used.*

- III. Rinse thoroughly with clean water before re-use or storage.

6. Storage

Following cleaning Vivacell devices may be stored for several weeks in a 20 % Ethanol solution. For best results, fill filtrate bottle with approximately 100 ml of solution, place concentrator in the bottle and then add a further 50 ml to the concentrator. This procedure will ensure that the membrane remains wetted throughout storage. Close with cap provided and preferably keep refrigerated.

7. Chemical Compatibility

Vivacell concentrators are designed for use with biological fluids and aqueous solutions. For chemical compatibility details refer to back page.

Table 2: Technical specifications		Vivacell 100
Concentrator capacity		
Swing bucket rotor	90 ml	
With pressure head	98 ml	
Dimensions		
Total length	123 mm centrifugal	
	197 mm with pressure head	
Width	62 mm	
Active membrane area	23.5 cm ²	
Hold up volume of membrane	<250 µl	
Dead stop volume	350 µl	
Operating requirements		
Rotor type	Swing bucket	
Rotor cavity	To fit 250 ml (62 mm) centrifuge bottles (maximum cavity depth 105 mm)	
Minimum effective speed	500 g	
Recommended speed	3,500 g	
Maximum speed	4,000 g	
Maximum pressure	5 bar (75 psi)	
Materials of construction		
Body	Polycarbonate	
Filtrate vessel	Polycarbonate	
Concentrator cap	Santoprene	
Pressure head	Acetal	
Membrane	Polyethersulfone	

Table 3: Typical performance		Time to concentrate 30x min. at 20° C			
90 ml start volume		In centrifuge 3,500 g	As pressure cell 4 bar (60 psi) pressure		Solute
		swing out rotor	No agitation	Orbital shake	recovery %
BSA 1.0 mg/ml (66,000 MW)					
5,000	MWCO PES	22	75	25	96 %
10,000	MWCO PES	16	60	20	96 %
30,000	MWCO PES	16	60	20	94 %
IgG 0.25 mg/ml (160,000 MW)					
50,000	MWCO PES	20	70	30	94 %
100,000	MWCO PES	20	85	30	90 %
Latex beads 0.004 % in DMEM + 10 % FCS (0.055 µm)					
300,000	MWCO PES	35	-	120	99 %
Latex beads 0.004 % in DMEM + 10 % FCS (0.24 µm)					
1,000,000	MWCO [†] PES	4	5	4	99 %

[†]2,000 g in centrifuge, 2 bar (29 psi) pressure

Table 4: Chemical compatibility (2 hr contact time)

Solution		Solution	
Acetic Acid (25.0 %)	OK	Mercaptoethanol (0.1 M)	OK
Acetone (10.0 %)	NO	Methanol (60 %)	OK
Acetonitrile (10.0 %)	OK	Nitric Acid (10.0 %)	OK
Ammonium Hydroxide (5.0 %)	?	Phenol (1.0 %)	OK
Ammonium Sulphate (sat)	OK	Phosphate Buffer (1.0 M) (pH 6-8)	OK
Benzene (100 %)	NO	Polyethylene Glycol	OK
n - Butanol (70 %)	?	Pyridine	NO
Chloroform (1.0 %)	NO	Sodium Carbonate (20 %)	OK
Dimethyl Formamide (10.0 %)	NO	Sodium Deoxycholate (5.0 %)	?
Dimethyl Sulfoxide (5.0 %)	OK	Sodium Dodecylsulfate (0.1 %)	OK
Ethanol (70.0 %)	OK	Sodium Hydroxide	NO
Ethyl Acetate	NO	Sodium Hypochlorite (200 ppm)	NO
Formaldehyde (30 %)	OK	Sodium Nitrate (1.0 %)	OK
Formic Acid (5.0 %)	OK	Sulfamic Acid (3.0 %)	OK
Glycerine (70 %)	OK	Tetrahydrofuran (5.0 %)	NO
Guanidine HCl (6 M)	OK	Toluene (1.0 %)	NO
Hydrocarbons, aromatic	NO	Trichloroacetic Acid (1 %)	OK
Hydrocarbons, chlorinated	NO	Trifluoroacetic Acid (10 %)	NO
Hydrochloric Acid (1 M)	OK	Tween 20 (0.1 %)	OK
Imidazole (50 mM)	NO	Triton X-100 (0.1 %)	OK
Isopropanol (25 %)	OK	Urea (8 M)	OK
Lactic Acid (50.0 %)	OK		

OK = Acceptable ? = Questionable NO = Not recommended

Ordering information

Vivacell 100 Polyethersulfone

With Polypropylene concentrator cap	Pack size	Prod. no.	Accessories	Pack size	Prod. no.
5,000 MWCO	2	VC1011	Air pressure controller (APC)		
5,000 MWCO	10	VC1012	complete with pressure gauge,		
10,000 MWCO	2	VC1001	regulator, over-pressure safety valve,		
10,000 MWCO	10	VC1002	female connector, 1 m extension line	1	VCA002
30,000 MWCO	2	VC1021	(4 mm pressure tubing) with male		
30,000 MWCO	10	VC1022	and female connectors and 1 m of		
50,000 MWCO	2	VC1031	6 mm inlet tubing		
50,000 MWCO	10	VC1032	Plastic pipettes	100	VPA005
100,000 MWCO	2	VC1041	Female connector	1	VCA010
100,000 MWCO	10	VC1042	Male connector	1	VCA011
300,000 MWCO	2	VC1051	4 mm pressure tubing (3 m)	1	VCA012
300,000 MWCO	10	VC1052	Santoprene replacement seals	10	VCA014
1,000,000 MWCO	2	VC1061	Vivacell 100 pressure head with	1	VCA800
1,000,000 MWCO	10	VC1062	replacement seals (5)		
0.2 µm	2	VC1071			
0.2 µm	10	VC1072			

Vivascience ultrafiltration product range at a glance

Product	Sample volume	Mode	Membranes available
Vivaspin 500	100 µl - 600 µl	Centrifugal	Polyethersulfone
Vivaspin 2	0.4 ml - 2 ml	Centrifugal	Polyethersulfone, Cellulose Triacetate Regenerated Cellulose, Hydrosart®
Centrisart	0.5 ml - 2.5 ml	Centrifugal	Polyethersulfone, Cellulose Triacetate
Vivaspin 4	1 ml - 4 ml	Centrifugal	Polyethersulfone
Vivaspin 6	2 ml - 6 ml	Centrifugal	Polyethersulfone
Vivaspin 15	2 ml - 15 ml	Centrifugal	Polyethersulfone
Vivaspin 15R	2 ml - 15 ml	Centrifugal	Hydrosart®
Vivaspin 20	5 ml - 20 ml	Centrifugal Gas pressure	Polyethersulfone
Vivacell 70	10 ml - 70 ml	Centrifugal Gas pressure	Polyethersulfone
Vivacell 100	20 ml - 100 ml	Centrifugal Gas pressure	Polyethersulfone
Vivacell 250	50 ml - 250 ml	Gas pressure	Polyethersulfone
Vivaflow 50	100 ml - > 5 l	Tangential flow	Polyethersulfone, Regenerated Cellulose
Vivaflow 200	500 ml - > 5 l	Tangential flow	Polyethersulfone, Regenerated Cellulose, Hydrosart®
Vivapore 2	0.5 ml - 2.5 ml/15 ml	Solvent absorption	Polyethersulfone, Regenerated Cellulose
Vivapore 5	1 ml - 5 ml	Solvent absorption	Polyethersulfone, Regenerated Cellulose
Vivapore 10/20	2 ml - 10 ml/20 ml	Solvent absorption	Polyethersulfone, Regenerated Cellulose
Vivapore Q5	0.5 ml - 5 ml	Solvent absorption	Polyethersulfone
Vivapore Q10	1 ml - 10 ml	Solvent absorption	Polyethersulfone



New Vivapure kits now available

The development of the innovative Vivapure range continues with the launch of new protein purification kits. These ion exchange kits provide all the required buffers, clarification columns, ultrafiltration devices, handbook and easy to follow bind-wash-elute protocols to isolate and purify proteins from a wide range of starting material.

Contact us for more details or visit www.vivascience.com

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