

Materials List for

Coupling Carbon Capture from a Power Plant with Semi-automated Open Raceway Ponds for Microalgae Cultivation

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Materials

Name	Company	Catalog Number	Comments
Adjustable speed motor (paddle wheel system)	Leeson	174307	Lesson 174307.00, type: SCR Voltage; Amps:10
Aluminum weight boats	Fisher Scientific	08-732-102	Fisherbrand Aluminum Weighing Dishes
Ammonium Iron (III) (NH ₄) ₂ [Fe(C ₂ H ₃ O ₂) ₆]	Fisher Scientific	1185 - 57 - 5	Medium preparation. Ammonium iron(III) citrate
Ammonium Phosphate	Sigma-Aldrich	7722-76-1	This chemical is used for the optimized medium
Ampicillin sodium salt	Sigma Aldrich	A9518-5G	This chemical is used for avoiding algae contamination
Autoclave	Amerex Instrument Inc		Hirayama HA300MII
Bacto agar	Fisher Scientific	BP1423500	Fisher BioReagents Granulated Agar
Bleach	Clorox		Germicidal Bleach, concentrated clorox
Boric Acid (H ₃ BO ₃)	Fisher Scientific	10043-35-3	Trace Elements: Boric acid
Calcium chloride dihydrate (CaCl ₂ *2H ₂ O)	Sigma-Aldrich	10035-04-8	Medium preparation. Calcium chloride dihydrate
Carboys (20 L)	Nalgene - Thermo Fisher Scientific	2250-0050PK	Polypropylene Carboy w/Handles
Centrifuge	Beckman Coulter, Inc		J2-21
Chloroform	Sigma-Aldrich	67-66-3	This chemical is used for lipid extraction
Citraplex 20% Iron	Loveland Products	SDS No. 1000595582 -17-LPI	https://www.fbn.com/direct/product/Citraplex-20-Iron#product_info
Cobalt (II) nitrate hexahydrate (Co(NO ₃) ₂ *6H ₂ O)	Sigma-Aldrich	10026-22-9	Trace Elements: Cobalt (II) nitrate hexahydrate
Compressor	Makita	MAC700	This equipment is used for the injection CO ₂ system

Control Valve	Sierra Instruments	SmartTrak 100	This item needs to be customized for your application. In our case, it was used a 5% CO2 and 95% air mixture.
Copper (II) Sulfate Pentahydrate (CuSO4*5H2O)	Sigma-Aldrich	7758-99-8	Trace Elements: Copper (II) Sulfate Pentahydrate
Data Logger: Campbell unit CR3000	Scientific Campbell	CR3000	This equipment is used for controlling all the system, motoring and recording data
Dissolve Oxygen Solution	Campbell Scientific	14055	Dissolved oxygen electrolyte solution DO6002 - Lot No. 211085
Dissolved Oxygen probe	Sensorex	?	DO6400/T Dissolved Oxygen Sensor with Digital Communication
Electroconductivity calibration solution	Ricca Chemical Company	2245 - 32 (R2245000-1A)	Conductivity Standard, 5000 uS/cm at 25C (2620 ppm TDS as NaCl)
Electroconductivity probe sensor	Hanna Instruments	HI3003/D	Flow-thru Conductivity Probe - NTC Sensor, DIN Connector, 3m Cable
Ethylenediaminetetraacetic acid disodium salt dihydrate (Na2EDTA*2H2O)	Sigma-Aldrich	6381-92-6	Medium Preparation: Ethylenediaminetetraacetic acid disodium salt dihydrate
Filters	Fisher Scientific	09-874-48	Whatman Binder-Free Glass Microfiber Filters
Flasks	Fisher scientific	09-552-40	Pyrex Fernbach Flasks
Furnace	Hogentogler	Model: F6020C-80	Thermo Scientific Thermolyne F6020C - 80 Muffle Furnace
Glass dessicator	VWR International LLC	75871-430	Type 150, 140 mm of diameter
Glass funnel	Fisher Scientific	FB6005865	Fisherbrand Reusable Glass Long-Stem Funnels
Laminar flow hood	Fisher Hamilton Safeair		Fisher Hamilton Stainless Safeair hume hood
Magnesium sulfate heptahydrate (MgSO4*7H2O)	Fisher Scientific	10034 - 99 - 8	Medium Preparation: Magnesium sulfate heptahydrate
Methanol	Sigma-Aldrich	67-56-1	Lipid extraction solvent
Micro bubble Diffuser	Pentair Aquatic Eco-Systems	1PMBD075	This equipment is used for the injection CO2 system
Microalgae: Chlorella Sorokiniana	NAABB	DOE 1412	
Microscope			Carl Zeiss 4291097
Microwave assistant extraction	MARS, CEM Corporation		CEM Mars 5 Xtraction 230/60 Microwave Accelerated Reaction System. Model: 907601
MnCl2*4H2O	Sigma-Aldrich	13446-34-9	Manganese(II) chloride tetrahydrate
Mortars	Fisher Scientific	FB961B	Fisherbrand porcelin mortars
Nitrogen evaporator	Organomation		N-EVAP 112 Nitrogen Evaporator (OA-SYS Heating System)
Oven	VWR International LLC	89511-410	Forced Air Oven
Paddle Wheel			8-blade horizontal axis propeller. This usually comes as part of the paddlewheel reactor.
Paddle wheel motor	Leeson	M1135042.00	Leeson, Model: CM34025Nz10C; 1/4 HP; Volts 90; FR 34; 62 RPM.
Pestles	Fisher Scientific	FB961M	Fisherbrand porcelin pestles
pH and EC Transmitter	Hanna Instruments	HI98143	Hanna Instruments HI98143-04 pH and EC Transmitter with Galvanic isolated 0-4V.
pH calibration solutions	Fisher Scientific	13-643-003	Thermo Scientific Orion pH Buffer Bottles

pH probe sensor	Hanna Instruments	HI1006-2005	Hanna Instruments HI1006-2005 Teflon pH Electrode with matching pin 5m.
Pipette tips	Fisher Scientific	1111-2821	1000 ul TipOne graduated blue tip in racks
Pipetter	Fisher Scientific	13-690-032	Eppendorf Reserch plus Variable Adjustable Volume Pipettes: Single-channel
Plastic cuvettes	Fisher scientific	14377017	BrandTech BRAND Plastic Cuvettes
Plates	Fisher scientific	08-757-100D	Corning Falcon Bacteriological Petri Dishes with Lid
Potash			This chemical is used for the optimized medium preparation. It was bought in a fertilizer local company
Potassium phosphate dibasic (K ₂ HPO ₄)	Sigma-Aldrich	7758 -11 - 4	Medium Preparation: Potassium phosphate dibasic
Pyrex reusable Media Storage Bottles	Fisher scientific	06-414-2A	1 L and 2 L bottles - PYREX GL45 Screw Caps with Plug Seals
Raceway Pond			Similar equipment can be bought at https://microbioengineering.com/products
Real Time Optical Density Sensor	University of Arizona		This equipment was design and build by a member of the group
RS232 Cable	Sabrent		Sabrent USB 2.0 to Serial (9-Pin) DB-9 RS-232 Converter Cable, Prolific Chipset, Hexnuts, [Windows 10/8.1/8/7/VISTA/XP, Mac OS X 10.6 and Above] 2.5 Feet (CB-DB9P)
Shaker Table			Algae agitation 150 rpm
Sodium Carbonate (Na ₂ CO ₃)	Sigma-Aldrich	497-19-8	Sodium carbonate
Sodium molybdate dihydrate (Na ₂ MoO ₄ *2H ₂ O)	Sigma-Aldrich	10102-40-6	Medium Preparation: Sodium molybdate dihydrate
Sodium nitrate (NaNO ₃)	Sigma-Aldrich	7631-99-4	Medium Preparation: Sodium nitrate
Spectrophotometer	Fisher Scientific Company	14-385-400	Thermo Fisher Scientific - 10S UV-Vis GENESTYS Spectrophotometer cylindrical Longpath cell holder; internal reference dectector, Xenon flash lamp; dual silicon photodiode; 240V, 50 to 60Hz selected automatically.
Test tubes	Fisher Scientific	14-961-27	Fisherbrand Disposable Borosilicate Glass Tubes with Plain End (10 ml)
Thermocouples type K	Omega	KMQXL-125G-6	
Urea	Sigma-Aldrich	2067-80-3	Urea
Vacuum filtration system	Fisher Scientific	XX1514700	MilliporeSigma Glass Vacuum Filter Holder, 47 mm. The system includes: Ground glass flask attachment, coarse-frit glass filter support, and flask
Vacuum pump	Grainger		Marathon Electric AC Motor Thermally protected G588DX - MOD 5KH36KNA510X. HP 1/4. RPM 1725/1425
Zinc sulfate heptahydrate (ZnSO ₄ *7H ₂ O)	Sigma-Aldrich	7446-20-0	Zinc sulfate heptahydrate