Economic Evaluation Report
for SimV2

diciembre 10, 2021

1. EXECUTIVE SUMMARY (2021 prices)

Total Capital Investment	44,206,000 $
Capital Investment Charged to This Project	44,206,000 $
Operating Cost	108,152,000 $/yr
Revenues	116,036,000 $/yr
Batch Size	104.91 kg MP
Cost Basis Annual Rate	8,288 kg MP/yr
Unit Production Cost	13,048.79 $/kg MP
Net Unit Production Cost	13,048.79 $/kg MP
Unit Production Revenue	14,000.00 $/kg MP
Gross Margin	6.79 %
Return On Investment	17.86 %
Payback Time	5.60 years
IRR (After Taxes)	11.54 %
NPV (at 7,0% Interest)	13,551,000 $

MP = Flow of Component 'Pheromone' in Stream 'PHERO'

2. EQUIPMENT SPECIFICATION AND FOB COST (2021 prices)

Main Equipment

Quantity/ Standby/ Staggered	Name	Description	Unit Cost ($)	Cost ($)
1 / 0 / 0	FR-101	Fermentor	672,000	672,000
		Vessel Volume = 1004,47 L		
1 / 0 / 0	FR-103	Fermentor	672,000	672,000
		Vessel Volume = 1004,17 L		
1 / 0 / 0	FR-102	Fermentor	672,000	672,000
		Vessel Volume = 1004,17 L		
1 / 0 / 0	R-101	Stirred Reactor	631,000	631,000
		Vessel Volume = 2685,55 L		
1 / 0 / 0	R-102	Stirred Reactor	460,000	460,000
		Vessel Volume = 268,42 L		
1 / 0 / 0	ST-101	Heat Sterilizer	214,000	214,000
		Rated Throughput = 600,00 L/h		
1 / 0 / 0	DS-103	Disk-Stack Centrifuge	210,000	210,000
		Throughput = 395,78 L/h		
1 / 0 / 0	DS-101	Disk-Stack Centrifuge	210,000	210,000
		Throughput = 395,90 L/h		
1 / 0 / 0	DS-102	Disk-Stack Centrifuge	210,000	210,000
		Throughput = 395,78 L/h		
1 / 0 / 0	BM-102	Bead Mill	132,000	132,000
		Bead Volume = 73,48 L		
1 / 0 / 0	BM-101	Bead Mill	132,000	132,000
		Bead Volume = 73,50 L		
1 / 0 / 0	BM-103	Bead Mill	132,000	132,000
		Bead Volume = 73,48 L		
1 / 0 / 0	DX-102	Differential Extractor	54,000	54,000
		Extractor Volume = 452,72 L		
1 / 0 / 0	C-101	Distillation Column	18,000	18,000
		Column Volume = 0,92 L		
1 / 0 / 0	C-102	Distillation Column	16,000	16,000
		Column Volume = 0,47 L		
		Unlisted Equipment		1,109,000
			TOTAL	5,544,000

3. FIXED CAPITAL ESTIMATE SUMMARY (2021 prices in $)

3A. Total Plant Direct Cost (TPDC) (physical cost)	
1. Equipment Purchase Cost	5,544,000
2. Installation	2,133,000
3. Process Piping	1,940,000
4. Instrumentation	2,218,000
5. Insulation	166,000
6. Electrical	554,000
7. Buildings	2,495,000
8. Yard Improvement	832,000
9. Auxiliary Facilities	2,218,000
TPDC	18,099,000

3B. Total Plant Indirect Cost (TPIC)	
10. Engineering	4,525,000
11. Construction	6,335,000
TPIC	10,860,000

3C. Total Plant Cost (TPC = TPDC+TPIC)	
TPC	28,959,000

3D. Contractor's Fee & Contingency (CFC)	
12. Contractor's Fee	1,448,000
13. Contingency	2,896,000
CFC = 12+13	4,344,000

3E. Direct Fixed Capital Cost (DFC = TPC+CFC)	
DFC	33,303,000

4. LABOR COST - PROCESS SUMMARY

Labor Type	Unit Cost ($/h)	Annual Amount (h)	Annual Cost ($)	%
Operator	69.00	79,152	5,461,470	100.00
TOTAL		79,152	5,461,470	100.00

5. MATERIALS COST - PROCESS SUMMARY

Bulk Material	Unit Cost ($)	Annual Amount		Annual Cost ($)	%
AHM	9,240.00	5,530	kg	51,097,200	53.49
Biomass	0.00	8	kg	0	0.00
Ethyl Acetate	120.00	40,829	kg	4,899,472	5.13
Glucose	0.00	3,786	kg	0	0.00
NaCl	0.03	8	kg	0	0.00
Peptone	10.00	2,840	kg	28,398	0.03
Prenol	5,000.00	7,900	kg	39,500,000	41.35
Water	0.00	183,584	kg	0	0.00
TOTAL				95,525,071	100.00

NOTE: Bulk material consumption amount includes material used as:
- Raw Material
- Cleaning Agent
- Heat Transfer Agent (if utilities are included in the operating cost)

6. VARIOUS CONSUMABLES COST (2021 prices) - PROCESS SUMMARY

THE CONSUMABLES COST IS ZERO.

7. WASTE TREATMENT/DISPOSAL COST (2021 prices) - PROCESS SUMMARY

Waste Category	Unit Cost ($)	Annual Amount		Annual Cost ($)	%
Solid Waste				555	83.85
WASTE01	0.07	2,719	kg	185	27.95
WASTE02	0.07	2,718	kg	185	27.95
WASTE03	0.07	2,718	kg	185	27.95
Aqueous Liquid				101	15.33
REF	0.00	181,041	kg	101	15.33
Organic Liquid				5	0.83
DIST	0.00	9,770	kg	5	0.83
Emissions				0	0.00
TOTAL				661	100.00

8. UTILITIES COST (2021 prices) - PROCESS SUMMARY

Utility	Unit Cost ($)	Annual Amount	Ref. Units	Annual Cost ($)	%
Std Power	0.10	79,563	kW-h	7,956	57.32
Steam	12.00	11	MT	135	0.97
Steam (High P)	20.00	11	MT	224	1.61
Cooling Water	0.05	1,719	MT	86	0.62
Chilled Water	0.40	13,687	MT	5,475	39.44
Hot Water	0.05	89	MT	4	0.03
TOTAL				13,881	100.00

9. ANNUAL OPERATING COST (2021 prices) - PROCESS SUMMARY

Cost Item	$	%
Raw Materials	95,525,000	88.32
Labor-Dependent	5,461,000	5.05
Facility-Dependent	6,272,000	5.80
Laboratory/QC/QA	819,000	0.76
Consumables	0	0.00
Waste Treatment/Disposal	1,000	0.00
Utilities	14,000	0.01
Transportation	0	0.00
Miscellaneous	60,000	0.06
Advertising/Selling	0	0.00
Running Royalties	0	0.00
Failed Product Disposal	0	0.00
TOTAL	108,152,000	100.00

10. PROFITABILITY ANALYSIS (2021 prices)

A.	Direct Fixed Capital	33,303,000 $
B.	Working Capital	9,237,000 $
C.	Startup Cost	1,665,000 $
D.	Up-Front R&D	0 $
E.	Up-Front Royalties	0 $
F.	Total Investment (A+B+C+D+E)	44,206,000 $
G.	Investment Charged to This Project	44,206,000 $

H.	**Revenue/Savings Rates**	
	PHERO (Main Revenue)	8,288 kg/yr

I.	**Revenue/Savings Price**	
	PHERO (Main Revenue)	13,758.66 $/kg

J.	**Revenues/Savings**	
	PHERO (Main Revenue)	116,035,740 $/yr
1	Total Revenues	116,035,740 $/yr
2	Total Savings	0 $/yr

K.	**Annual Operating Cost (AOC)**	
1	Actual AOC	108,152,000 $/yr
2	Net AOC (K1-J2)	108,152,000 $/yr

L.	**Unit Production Cost /Revenue**	
	Unit Production Cost	13,048.79 $/kg MP
	Net Unit Production Cost	13,048.79 $/kg MP
	Unit Production Revenue	14,000.00 $/kg MP

M.	Gross Profit (J-K)	7,884,000 $/yr
N.	Taxes (40%)	3,154,000 $/yr
O.	Net Profit (M-N + Depreciation)	7,894,000 $/yr

	Gross Margin	6.79 %
	Return On Investment	17.86 %
	Payback Time	5.60 years

MP = Flow of Component 'Pheromone' in Stream 'PHERO'