ISHA'S GMP CONSULTANCY PVT. LTD.
Ensuring Global GMP Compliance

TETRABENAZINE

API MASS BALANCE | SOURCE-WORKBOOK TECHNICAL ILLUSTRATION

TECHNICAL REVIEW

RECORDED MB INPUT / OUTPUT	FULL ITEMISED INPUT	FINAL API OUTPUT	REPORTED YIELD
161.870 / 161.870 kg	172.170 kg	1.000 kg	18.1%

PROCESS FLOW | FC & MB WORKSHEETS

Source process order - not a validated manufacturing instruction

STAGE A: Reaction → Filtration → Distillation → pH & work-up → Distill / isolate → Filtration → Drying → Stage-A solid

STAGE B: Stage-A transfer + methanol → Purification → Filtration → Drying → Final Tetrabenazine (1.00 kg)

MB MATERIAL INPUTS | 12 CHARGE LINES

#	Material / process addition	Qty (kg)
1	6,7-dimethoxy-3,4-dihydroisoquinoline.	3.330
2	3-((Dimethylamino)methyl)-5-methylhexane-2-one iodomethane	6.700
3	Reducer	24.000
4	Water	2.700
5	Reducer	2.000
6	Methyl tert-butyl ether	101.000
7	Sodium hydroxide	0.140
8	Water	15.000
9	Methanol	7.000
10	Stage-A (internal)	1.300
11	Methanol	8.000
12	Methanol	1.000
	Itemised gross input	**172.170**

MB OUTPUT STREAMS | 15 LINES

#	Output stream / loss	Qty (kg)
1	Evopration loss	1.200
2	Solid waste	1.000
3	Evopration loss	1.500
4	Distillate	24.000
5	Evopration loss	2.500
6	Aqueous layer to ETP	15.000
7	Evopration loss	2.600
8	Distillate	95.000
9	Evopration loss	7.070
10	Evopration loss	2.000
11	Stage-A solid (intermediate)	1.300
12	Evopration loss	0.500
13	filtrate	7.000
14	Evopration loss	0.200
15	Tetrabenazine API (final)	1.000
	Itemised total output	**161.870**

MOLAR & CONSUMPTION DATA | MOLES

Raw material	MW	Moles / ratio	Proposed MT/day
6,7-dimethoxy-3,4-dihydroisoquinoline.	191.23	17.41 / 1.00	1.665
3-((Dimethylamino)methyl)-5-methylhexane-2-one iodomethane	313.31	21.39 / 1.23	3.350
Reducer	-	-	13.000
Methyl tert-butyl ether	-	-	50.500
Sodium hydroxide	40.00	3.50 / 0.20	0.070
Methanol	-	-	8.000

CC / RM: 6 listed materials | Charge-sheet total: 153.170 kg

Additional MB water: 17.700 kg | Internal transfer: 1.300 kg

STAGE RECONCILIATION | ITEMISED VALUES

Scope	Inputs (kg)	Outputs (kg)	Delta (out-in)
Stage A (reaction to Stage-A solid)	161.870	153.170	-8.700
Stage B (purification to final API)	10.300	8.700	-1.600
Gross itemised lines (incl. internal transfer)	**172.170**	**161.870**	**-10.300**
MB source-stated grand totals	161.870	161.870	+0.000

YIELD CHECK

Workbook yield: 18.1%. 1.000 / 1.659 x 100 = 60.28% if the theoretical quantity is kilograms; basis and unit must be verified.

Material accounting: CC charge total 153.170 kg + MB water 17.700 kg = 170.870 kg of apparent fresh charges. Add 1.300 kg internal Stage-A transfer to obtain 172.170 kg gross itemised inputs.

WASTE STREAMS & CRITICAL SOURCE CHECKS

Waste stream (MB sheet)	kg	MT/month	MT/day
Liquid effluent (ETP)	15.000	0.225	0.0075
Solid waste (offsite)	1.000	0.015	0.0005
Fugitive emissions (scrubbing)	28.370	0.420	0.00042

SOURCE-REVIEW FLAGS

- Sum of itemised evaporative losses = 17.570 kg; fugitive-emission summary reports 28.370 kg.
- The 95.000 kg distillate is also labelled "Recovery of methanol", but CC records only 16.000 kg methanol charge.
- Waste summary MT/day for emissions (0.00042) is inconsistent with 0.420 MT/month on a 30-day basis.
- Stage-level output shortfalls: A 8.700 kg; B 1.600 kg. Reconcile before GMP approval.

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All quantities reproduced from source workbook or explicitly recalculated. Subject to technical confirmation.