

Patented Cost-effective 3MCPDE & GE Mitigation Technology



IChemE (POPSIG) Webinar

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Presentation Outline

1. A Practitioner's Wish List
2. Process Description for Chlorine Extraction
3. Process Description 3MCPDE Mitigation
4. Process Description GE Mitigation
5. Commercial Scale Plant results
6. EFSA Regulations for Baby Food
7. CAPEX & OPEX
8. IChemE Palm Oil Award 2020
9. Conclusion

A Practitioner's Wish List to Mitigate 3MCPDE & GE



Minimum disruption to existing Refinery or Mill Process



No Reduction in Plant Throughput



No effect on Final RBD Palm Oil quality in terms of FFA%, Colour, M&I etc at the same time achieve 3MCPDE < 1.25 PPM and GE < 1 PPM



Minimum Oil loss in water used for Chlorine extraction



No additives added in the process affecting any certification system (Halal, Kosher etc)



Minimum additional load on WWTP (avoid expanding WWTP or building a new one)



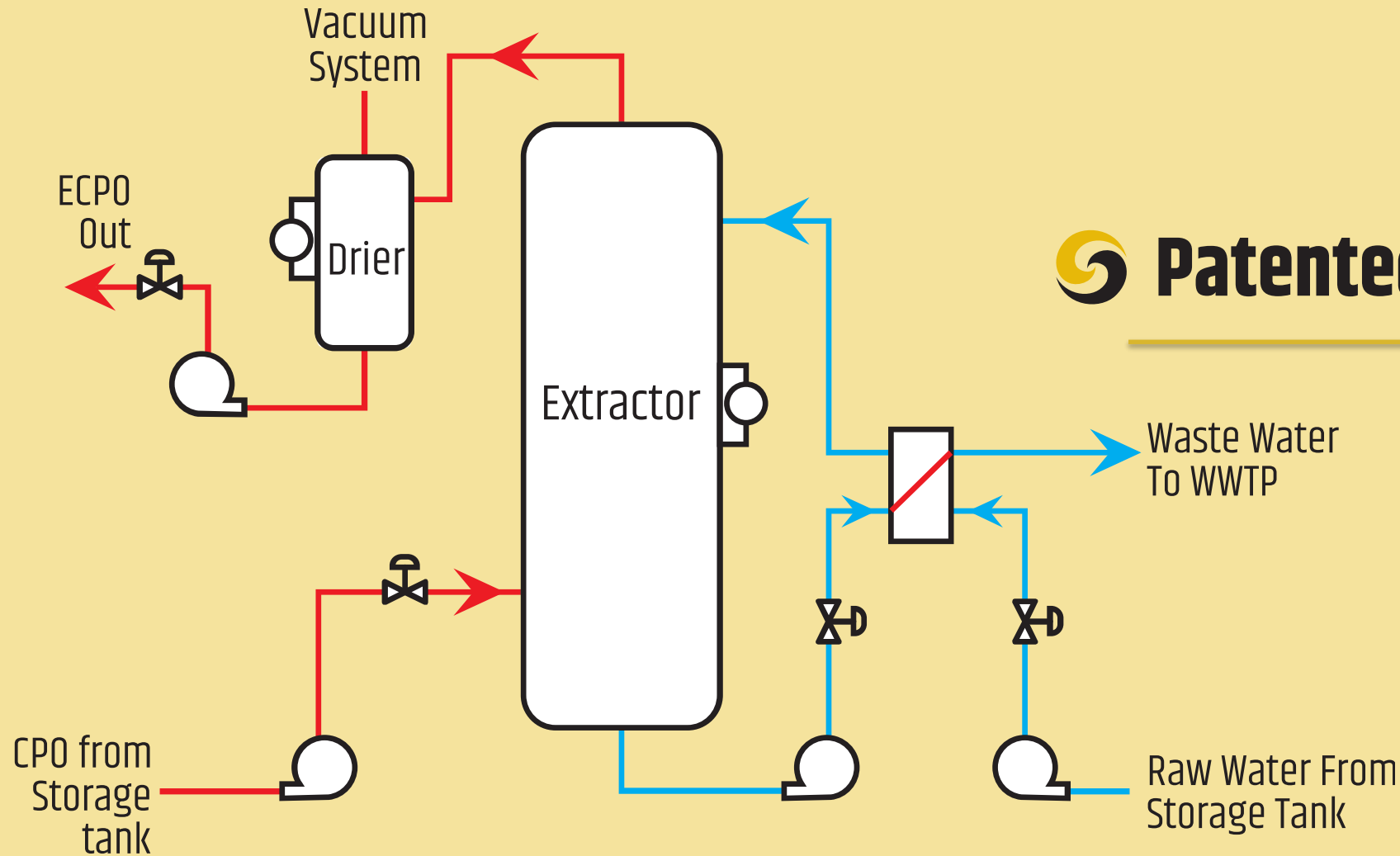
No increase in Maintenance cost and downtime for maintenance



Integrate 3MCPDE/GE Mitigation process seamlessly in to Refinery /Mill Operations including 1 common SCADA system.



Achieve all the above at lowest CAPEX & Minimum increase in OPEX (preferably no increase at all)



 **Patented Technology**

CPO Chlorine Extraction System

Process Description

Chlorine Extraction

Raw material is CPO before drier.

A patented Liquid-Liquid (L/L) Extraction column for Chlorine removal in CPO.

No additives used for L/L extraction.

The Extraction system is once through for CPO & Water.

No emulsification observed in extractor column.

Fully automated system that can be integrated with existing SCADA or as a stand-alone system.

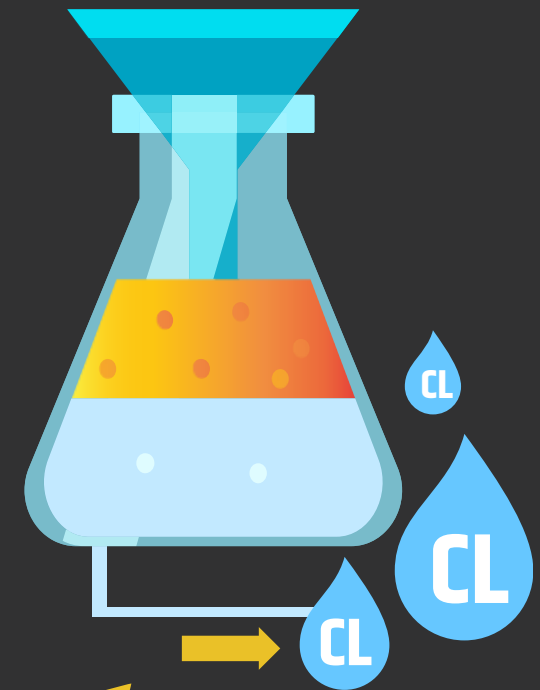
Moisture in CPO after Cl extraction and drying is <0.25%.

Unique extractor design guarantees Oil in waste water <0.1% (commercial plant results show nil)

Very low COD in the waste water, <2000 ppm (no upgradation of WWTP in most cases)

Practically maintenance free (No moving parts in extractor)

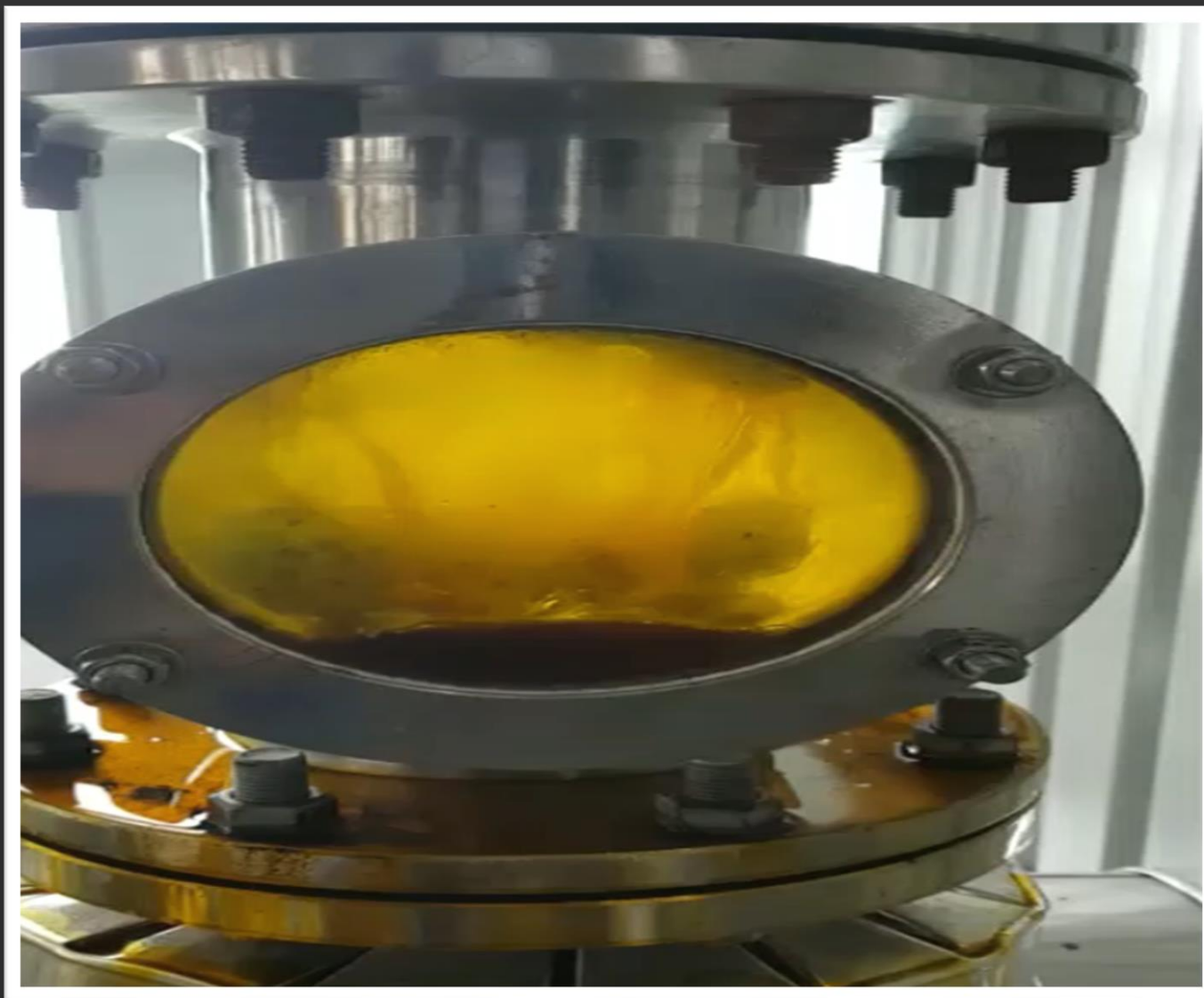
No reduction in CPO throughput.
Guaranteed Cl in CPO < 2ppm.



**ECPO –
CPO after extractor**



**Waste Water after
Extraction Showing Nil Oil.**



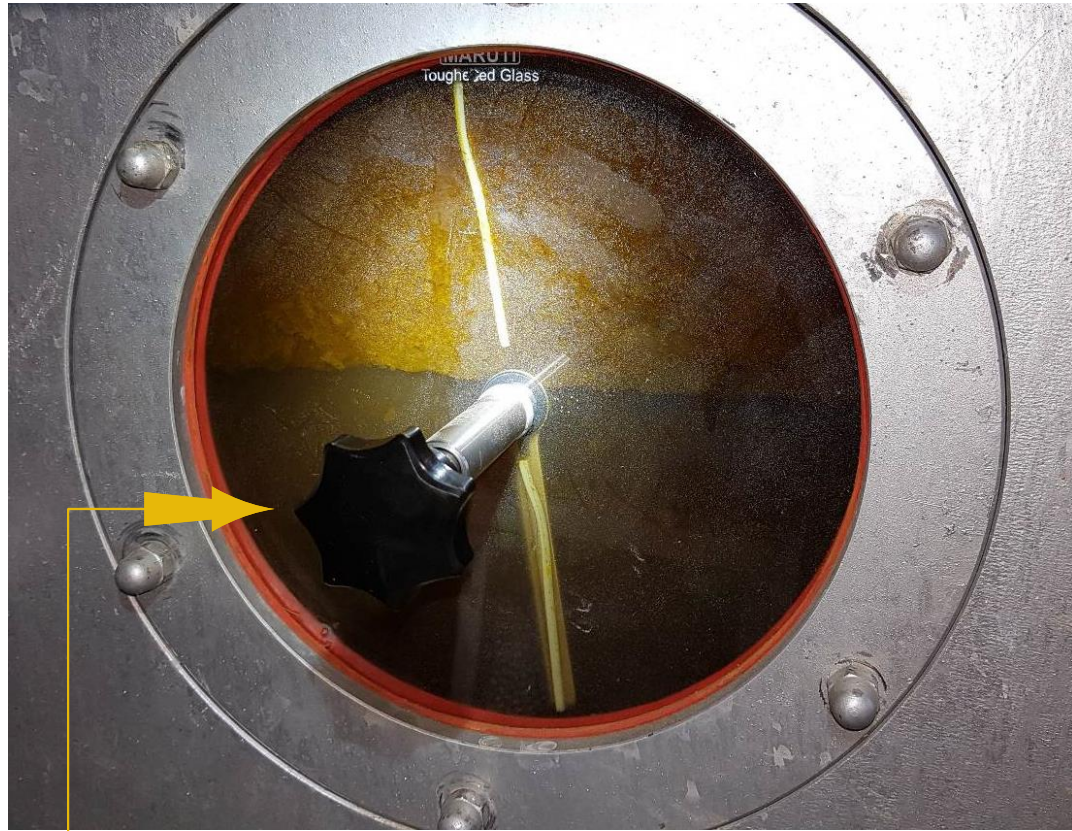
ECPO CPO after extractor



**Waste Water from extractor
Extraction Showing Nil Oil.**



**Waste Water from
Separator System
Oil in Water 1-1.5%
Fully Emulsified**



oil – Water Interface

ECPO – CPO after extractor





oil – Water Interface

Process Description

3MCPDE Mitigation/Chlorine Removal from CPO

OPEX
0.25 USD
per MT

Raw material is CPO with PORAM specs with no special treatment at Mills.

A proprietary Liquid-Liquid Extraction column is used for extracting Chlorides in CPO.

Water without additives is used as liquid for extraction.

The Extraction system is once through for CPO & Water.

Extraction system is fully automated and can be integrated with existing refinery SCADA or can operate as a stand-alone system.

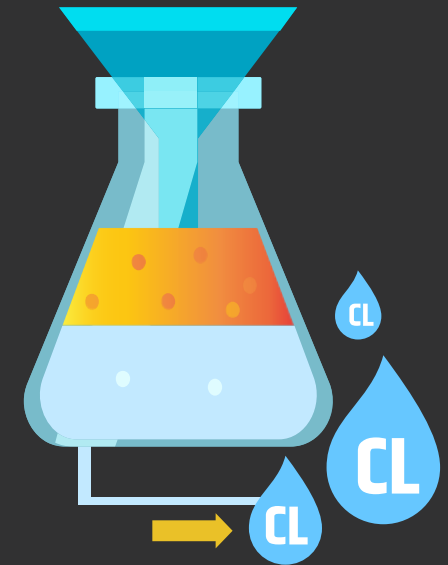
Washed CPO moisture is maintained at $<0.25\%$.

Oil in waste water is $<0.1\%$.

No moving parts in extractor so practically maintenance free.

No reduction in CPO throughput.

Guaranteed 3MCPD Esters < 2 PPM in RBDPO



Process Description

GE Mitigation

OPEX
1.75 USD
per MT

This is done by multiple ways and have to be customized based on site condition.

Use of Sumwin formulated adsorbent **REDGEM** to replace the bleaching earth.

Improve the vacuum in the Deodorizer to < 1.5 mbar.

Reduce the pressure drop in the deodorizer / stripper column to subsequently reduce the boiling point of PFAD.

Modify the stripper column and reduce the operating vacuum to < 1.5 mbar and boiling temp to less than 245 deg C.

Combination of above steps based on site conditions guarantee GE < 1 ppm.

Our Proprietary designed GE post stripper can guarantee GE < 0.5 ppm.

The combination is selected considering least effect on OPEX.

No compromise on throughput is a key factor.

Reduction in oil loss in **REDGEM** as compared to bleaching earth.



SUMWIN'S PROPRIETARY ADSORBENT TO MITIGATE 3MCPDE & GE



KEY ADVANTAGES

- REDUCES PRECURSORS TO 3MCPDE & GE
- LOWER OIL LOSS IN SPENT EARTH
- SAME OR BETTER RBDPO QUALITY – COLOR, M&I
- NO CHANGE REQUIRED IN BLEACHING PLANT

For enquiries please contact:

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Commercial Scale Plant Results



Chlorine Results

CPO Feed	Water Feed	Water	TC in CPO	TC in WCPO	Oil in wash water
Kg/Hr	Kg/Hr	%	ppm	ppm	%
63137	5289	8.38%	8.99	1.35	ND
61516	5583	9.08%	11.97	3.48	ND
63187	5295	8.38%	8.9	0.97	ND
56224	5342	9.50%	13.28	3.8	ND

3MCPDE Results

	Chloride	3MCPDE	Oil in wash water
	ppm	ppm	%
WCPO	1.86	NA	Nil
RBDPO	1.16	1.03	NA
RBD OL	1.41	1.23	NA
RBD ST	0.54	0.6	NA

Average 3MCPDE values from a 2 year run at a 1500 TPD Palm Oil Refinery Malaysia



Flow Rate	TC IN CPO	TC IN WCPO	3MCPDE RBDPO	3MCPDE RBDOL
MT/Hr	ppm	ppm	ppm	ppm
60	10.3	1.27	0.97	1.23
58	6.65	1.02	0.8	1.14
60	7.73	1.3	0.86	1.29
63	8.99	1.35	1.1	1.38

GE Results

TYPE OF OIL	GE
	ppm
Degummed CPO	0.00
REDGEM BPO	0.03-0.09
RBD PO	0.25-0.90

LATEST EFSA REGULATIONS ON 3MCPDE & GE FOR BABY/INFANT FOOD

	3MCPDE	GE
	PPM	PPM
EFSA Specs, Clause	4.3.2	4.2.2
Baby/Infant/Young Children	0.75	0.5

Annex to Regulation (EC) No. 1881/2006, Sept 23, 2020

Capex and Opex



Lowest CAPEX



No increase in OPEX due to throughput reduction.



Very low maintenance downtime and cost.



Might not require expansion of WWTP facility. (Huge saving in CAPEX/OPEX)



Huge savings due to virtually nil oil in waste water and reduced maintenance cost (typically USD 3.0 Million/year for a 1500 TPD refinery over alternate technologies)

Capex and OPEX will be estimated on case to case basis.



Institution of Chemical Engineers

Founded 1922
Incorporated by Royal Charter 1957

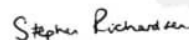
Sumwin Solutions Malaysia

*Patented 3MCPDE and Glycidyl Esters (GE)
Mitigation Technology*

Winner of the

Palm Oil Award

at the 2020 IChemE Malaysia Awards



Stephen Richardson

Stephen Richardson CBE FREng FIChemE
President



Jon Prichard CEng FICE FInstRE
Chief Executive












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CONCLUSION — MISSION ACCOMPLISHED!

Your Wish List

-  Minimum disruption to plant
-  No reduction in Plant throughput
-  3MCPDE < 2.5 PPM, GE < 1 PPM & no change in other RBD Palm oil quality.
-  Minimum Oil loss in water for Chlorine extraction
-  No additives affecting Halal, Kosher etc.
-  Avoid WWTP expansion
-  No increase in Maintenance cost and downtime
-  Integrated 1 common SCADA system.
-  All the above at low CAPEX & OPEX

The Sumwin Solution

-  Seamlessly integrated in Refinery or Plam oil Mill
-  No drop in Plant throughput
-  3MCPDE < 1.25 PPM, GE < 0.5 PPM & no change in other RBD Palm oil quality.
-  Guaranteed oil loss in water <0.1%, practically nil
-  No additives
-  No need WWTP expansion
-  No increase in Maintenance cost and downtime
-  Intergrated SCADA
-  Low CAPEX and OPEX(<US\$ 2.0/MT), huge savings over alternate technologies

THANK YOU

For enquiries please contact:

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