

Crude Oil Degradation Studies Using Biological Treatment with CUSTOM E- CRUDE SPILL

Experimental trials done at DBT- Centre For Energy Biosciences
Institute of Chemical Technology, Mumbai

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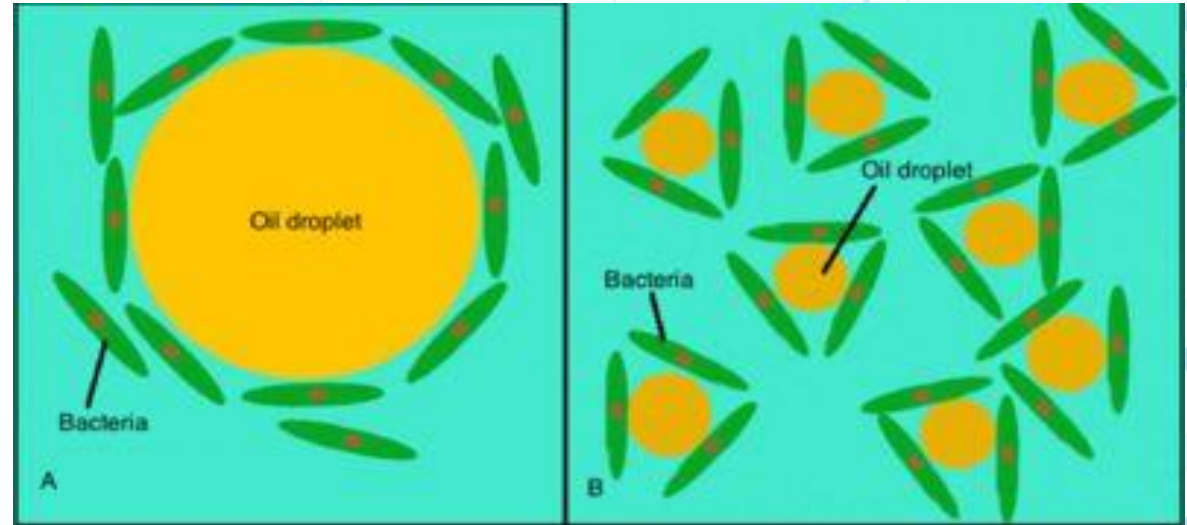


custom enzymes



custom enzymes

Biological method for removal of Crude oil from a Crude Oil-in-Water System



CUSTOM E – CRUDE SPILL

Biodegradation of oil – Direct application



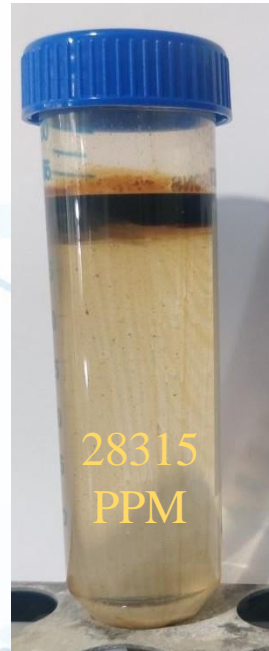
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DOSAGE:

Recommended Dosage: 5 - 10 Kg/Ton of oil,
to be optimized based on requirements.



20°C
15 days



5.8% Oil removal

45-60 days with
addition of nutrients

Near complete removal



Three Step process for intensified removal of Crude oil from a Crude Oil-in-Water System



Step 1 :
Physical separation to remove bulk of the oil
(Traditional 2-phase separators)

Step 2 :
Coagulation to entrap oil
(Flocculant – coagulant Combination)

Step 3 :
Biodegradation of entrapped oil
(Custom Enzymes Product)



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Step 1 :
Physical separation to remove bulk of the oil
(Traditional 2-phase separators)

Initial
Polluted
Seawater



Physical Oil Skimming



93% oil reduction

Oil
Separated
Seawater



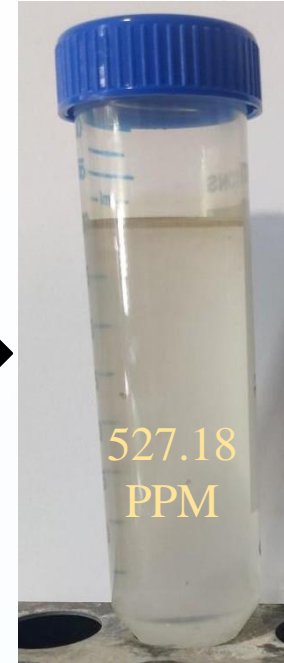
Biodegradation of oil



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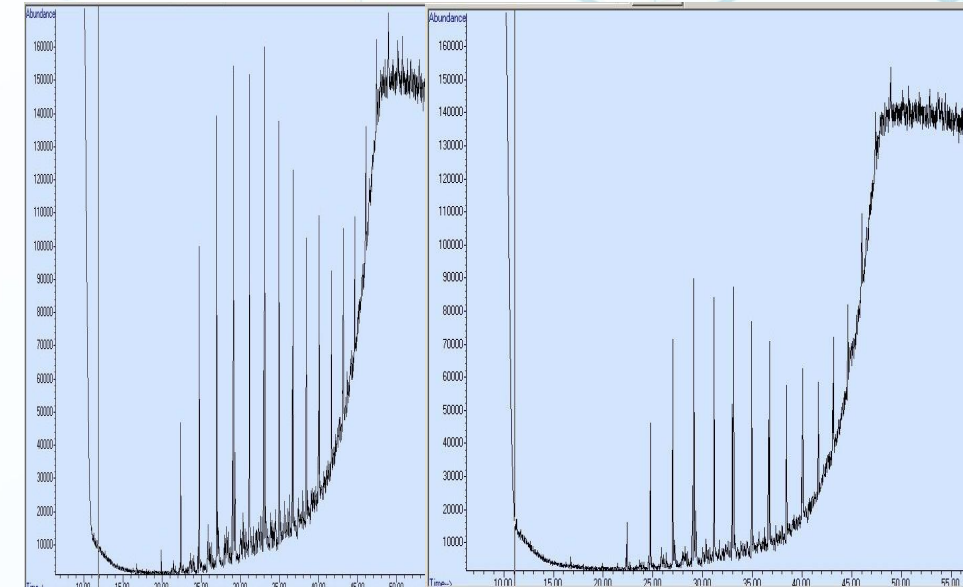
20°C
15 days



73.4% Oil removal

DOSAGE:

Recommended Dosage: 5 - 10 Kg/Ton of oil,
to be optimized based on requirements.



Oil present is digested by the Enzymes and Microbes in CUSTOM E - CRUDE SPILL to effect oil removal from the contaminated sea-water

**Step 2 :
Coagulation to entrap oil
(Flocculant – coagulant Combination)**

**Addition of
Coagulant**



Aeration for 10 mins

**Addition for
Flocculant**



**20 mins Settling for
sludge formation**



Slow aeration for 10 mins



**>90% oil
removal**

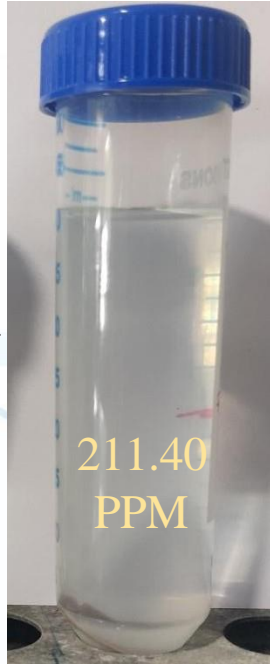
Step 3 :
Biodegradation of entrapped oil
(Custom Enzymes Product)

DOSAGE:

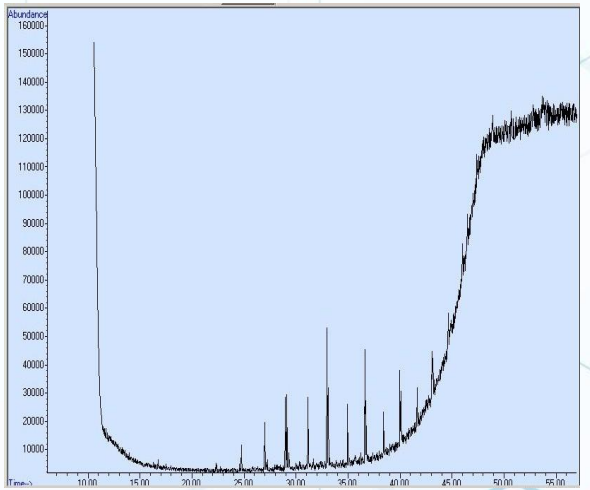
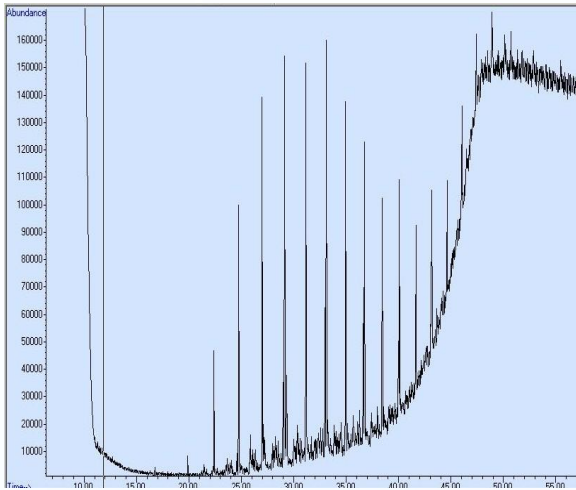
Recommended Dosage: 5 - 10 Kg/Ton of oil,
to be optimized based on requirements.



20°C
15 days



89% Oil removal



Floc-entrapped oil is rapidly digested by the Enzymes and Microbes in CUSTOM E - CRUDE SPILL to effect better oil removal from the contaminated sea-water

Overall Process

DOSAGE:

Recommended Dosage: 5 - 10 Kg/Ton of oil,
to be optimized based on requirements.



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Contaminated
Sea water

28°C
1 hour



After
skimming

28°C
15 mins



After
Coagulation

20°C
15 days



After Biological
treatment

**Overall Removal of the oil from Contaminated
Water – 99%**

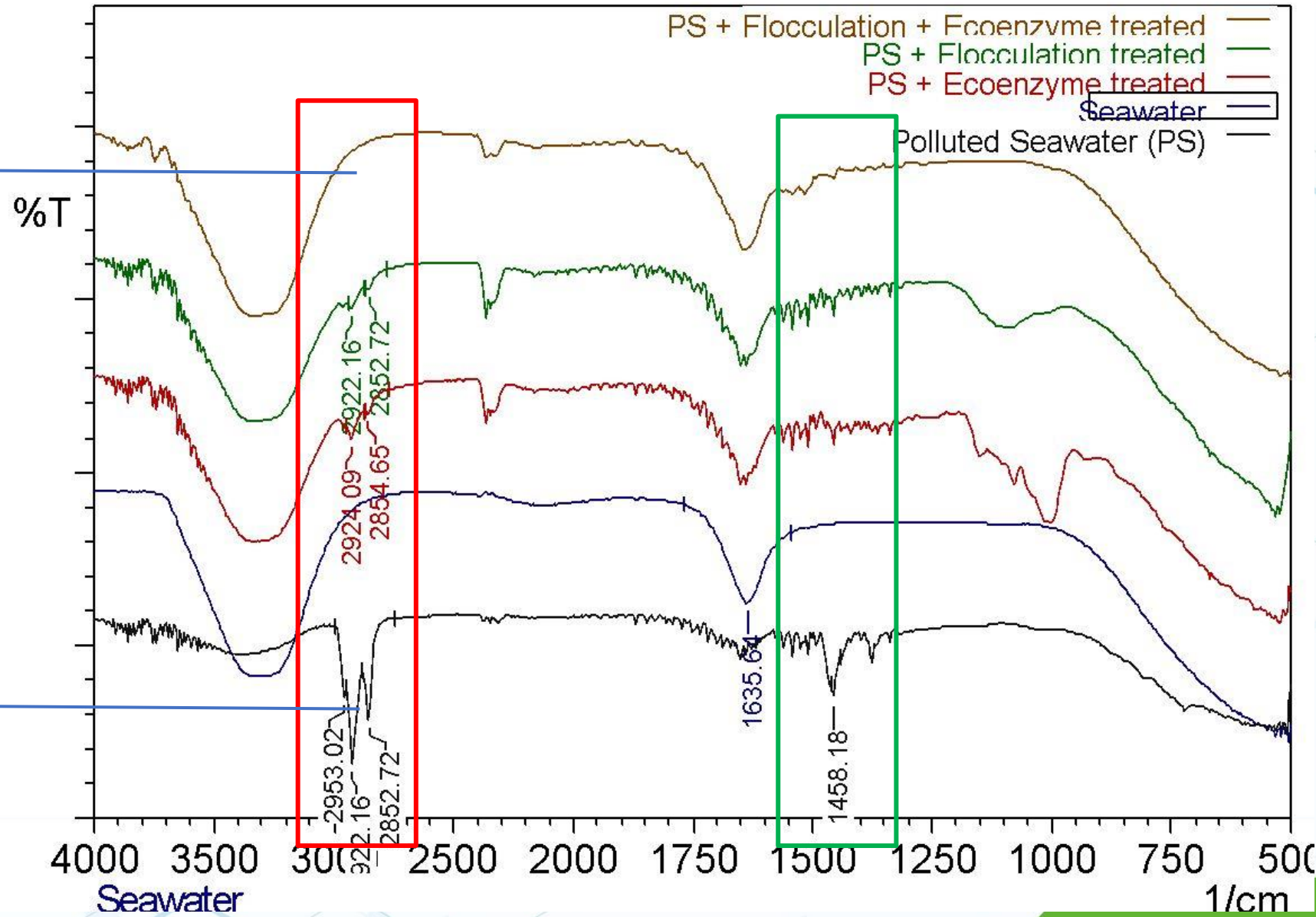
FTIR analysis



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After treatment,
Absence of
alkane peaks

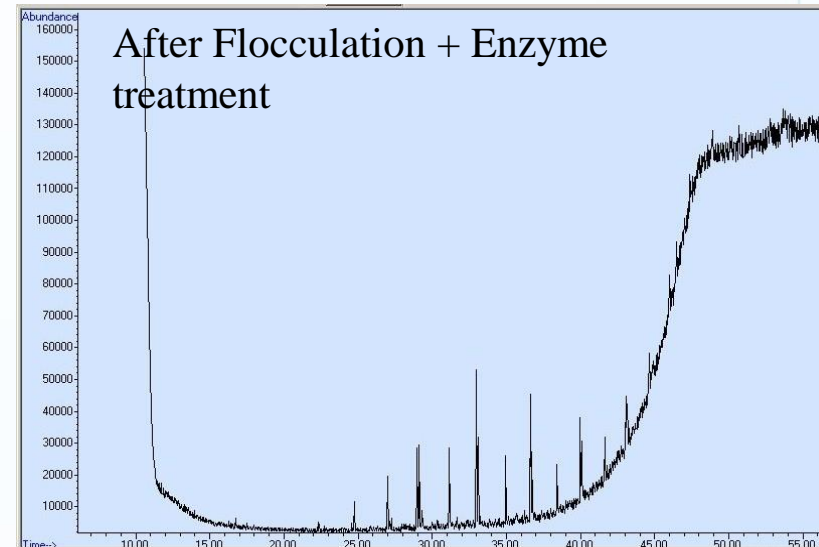
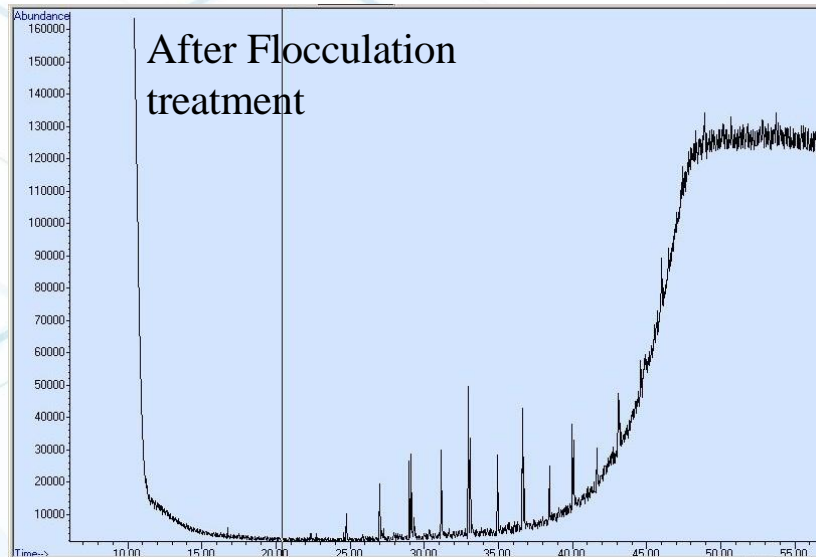
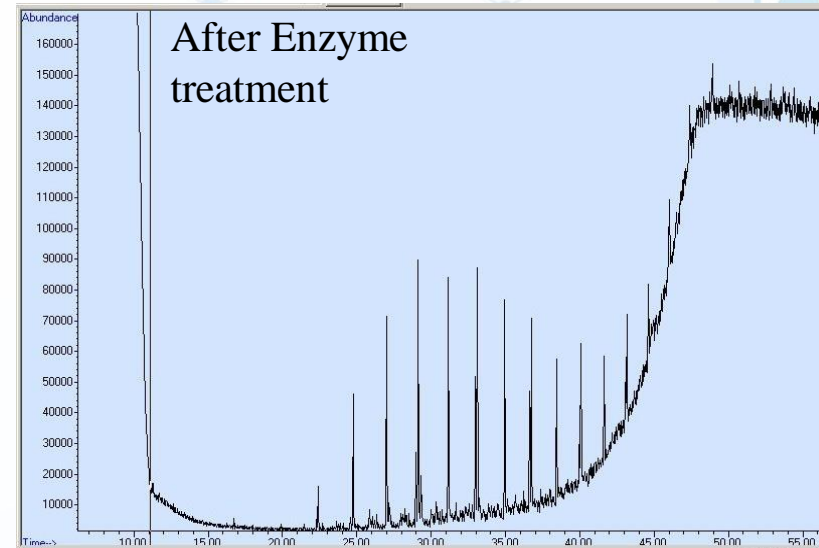
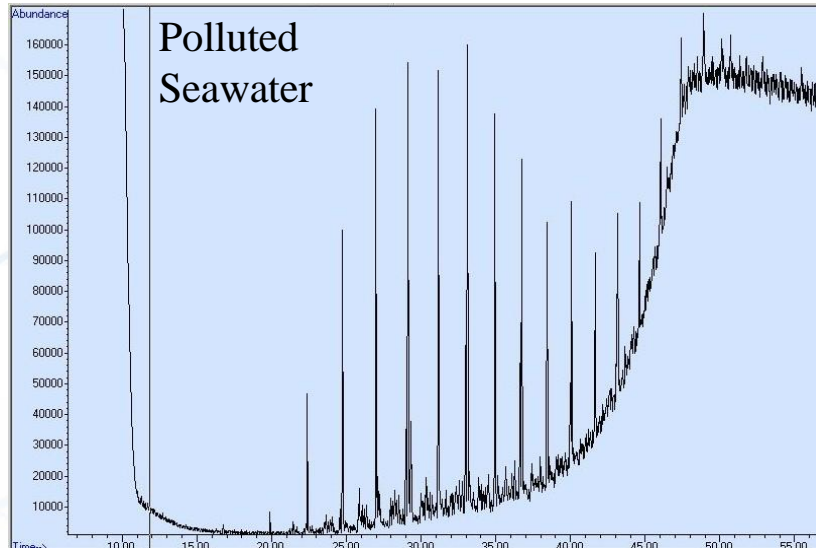
Before treatment,
Presence of
alkane peaks



GC-MS analysis



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**Effective
reduction in
oil
components**

After treatment, reduction in the intensity of Oil peaks were observed

Conclusion

CUSTOM E – CRUDE SPILL is an effective means of removal of Crude oil from a Crude oil in Water system.

Process of oil removal using CUSTOM E - CRUDE SPILL can be intensified by a three step process ensuring >99% oil removal; wherein bulk Crude oil can be recovered and the unrecoverable Crude oil can be entrapped in flocs to be effectively digested by the Enzymes and Microbes in CUSTOM E - CRUDE SPILL.