An investigation for a viable method for commercial oil extraction from Trinidad tar sands.

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Introduction

Map of Trinidad showing the pitch lake and the Parrylands/Guapo area.
Introduction

Picture of tar sand outcrop in the Parrylands/Guapo area.
Trinidad tar sands

- **Resource:**
  - About 2.5 billion bbls of oil in place on land.

- **Extent:**
  - About 7900 acres.
  - About 1000 times smaller than Canadian tar sands.
  - Depth varying from surface to less than 500 feet.
Mining of Trinidad tar sands?

- Size.
- Environment.
- Infrastructure cost.
Trinidad tar sands vary in depth from surface to less than 500 feet.
Experimental study

- Solvent extraction.
- Electrical heating.
- Microwave heating.
Tar sand sample

Picture of tar sand sample before extraction.
Solvent Extraction

Picture of solvent extraction apparatus and the sand left after extraction.
Results

- Weight before oil extraction – 4.95g.
- Weight after oil extraction – 3.81g.
- Water content. (Dean-Stark Trap) – 1.32% by weight
- Weight % of oil extracted – 21.7%.
- API Gravity of oil – 6.8
Electrical Heating

Electrical heating apparatus, sand after heating and oil extracted.
Electrical Heating

- Three different investigations were done using the electrical heater:
  - Total extraction – 14.5% by weight.
  - Heating for different periods of time.
  - Heating at different power supply.
Electrical heating

- Heating for different periods of time.

weight % oil extracted over time for different heating times.
Electrical heating

- Heating at different power supply.

Weight % oil extracted over time for different power supply

Time (min)

Weight % oil

20 min. @ 2.5A
20 min. @ 2.0A
Electrical heating

- Energy balance.

<table>
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<th>Operation time (min)</th>
<th>Power (W)</th>
<th>Energy Consumed (J)</th>
<th>Energy equi. Of oil (J)</th>
<th>Energy Ratio</th>
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Microwave Heating

Frequency - 2450Mhz

Temperature – 185 °C
Conclusion

- **Solvent extraction:**
  - Cost, environmental and health impacts.

- **Electrical heating:**
  - Efficiency of our equipment.

- **Microwave heating:**
  - Frequency.
  - Graphite sample holder.
Questions?