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MICROWAVE AND ULTRASONIC GREEN TECHNIQUE FOR BIO-OIL PRODUCTION

PRODUCT DESCRIPTION

Jatropha oil is a non-edible vegetable oil produced by an extraction process. The oil crop plant contains a high amount of oil (20-40%) compared to other vegetable oil. Moreover, Jatropha oil has potential as renewable feedstocks for biodiesel production. Water is used in the extraction process instead of using chemical . The optimization of Jatropha oil and it physico-chemical properties are studied.

PROBLEMS STATEMENT

Chemical solvent such as hexane is used widely in the extraction process of Jatropha oil which caused hazardous air pollution and health hazard. Hexane is also very expensive solvent.

PRODUCT ADVANTAGES

• Bio-oil can be used as an alternative fuel to replace fossil fuel.Jatropha oil can be blended in for the biofuel industry.

NOVELTIES

- Green technology.
- Extractant water is readily abundant.
- Cost effctive.
- No generation of harmful chemical fumes.
- Non toxic technology.
- Environmental friendly.
- Energy saving.

POTENTIAL APPLICATION

- Expand the extraction process from lab scale to pilot scale and then to industrial scale.
- Water extraction therefore safe.
- Many medical health applications.
- Biodiesel production.
- Basic resource for soap production.

PUBLICATION

- Norfaezah Ahmad, Zainab Hamzah and Othman Hashim (2015). Comparative study between microwave assisted extraction and soxhlet extraction techniques for bio-oil extraction from Jatropha curcas. Procedia Engineering (in review).

INDUSTRIAL COLLABORATION

Malaysia Techincal University Network (MTUN CoE), grant 9016-00005

PROCESS FLOW

Sample preparation : drying, grinding and sieving

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Water extraction

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Optimization of Jatropha oil

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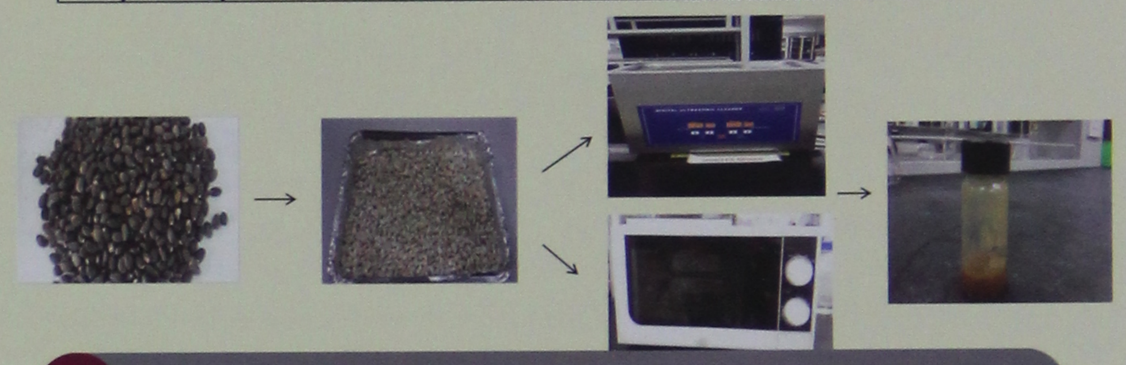
Physico-chemical analysis
(oil content,specific gravity, pH, color, acid value,free fatty acid,peroxide value, saponification value)



PRODUCT PERFORMANCES

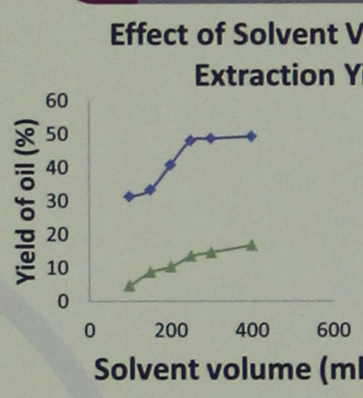


Figure 1: Effect of solvent to solid ratio on oil yield.

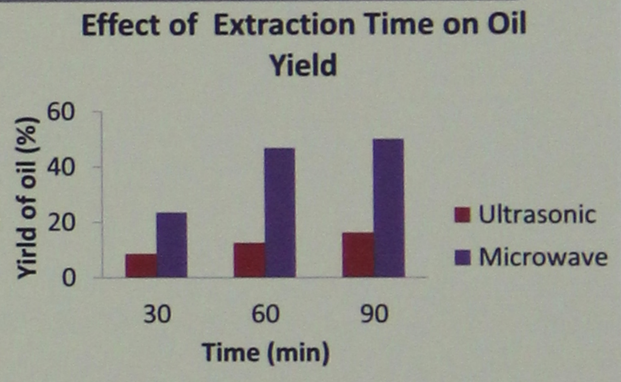


Figure 2 : Effect of extraction time on oil yield.

Parameters	Value
Oil content (w/w%)	16.31
Specific gravity	0.903
Ph	5.53
Color	Golden Yellow
Acid value (mgKOH/g)	4.48
Free fatty acid	2.24
Peroxide value (Meq/kg)	8.4
Saponification value (mgKOH/g)	215.98

Figure 3: Physico-chemical properties of Jatropha oil.

- Increase oil yield from 4.70 to 16.77%.
- Oil yield increase as extraction time increase with 8.69 to 16.31% from 20 to 90 minutes.
- High free fatty acid value shows existence of oxidative product in oil bath.
- High saponification value indicate the oil contain normal triglycerides.

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