

DOE/R4/10136 -- T1

Final Report

on

Solar Still

to

Dept. of Energy

Grant No. DE-FG44-80R410136

13-0249

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July 20, 1982

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Summary Solar Power Alcohol Distillation

The utilization of solar power for distillation, in our project proved not to be effective from a proof (i.e. 100 proof), flow (minimal) and a cost to construct (approximately *\$1,500 materials alone.)

The reason for limited success was that a packed column was used to facilitate separation of the alcohol / water vapors. Passive solar could best be applied to pre-heat make-up water for fermentation and to maintain proper fermentation temperatures during the winter; or,

in a vacuum still, passive could be effective in providing 150° F temperatures.

Body of Report

We were not able to achieve higher than 120-140 proof range by using the solar still. We were only able to achieve that high of proof due to adding a packed column packed with popped popcorn which gave good surface area for the water vapors of the alcohol/water vapor coming from the still to absorb the water away from the alcohol

(the cracked corn research as done in the 1920's) thereby upping the proof. The concept we first presented (allowing the vapors to condense on the inside of inclined glass) allowing the alcohol to remix with water negating the distillation process. A way to increase the proof is to add a taller column. A way to increase the flow amount is to use the solar box but add a heat exchanger inside to further increase net B.T.U. input

effecting a greater evaporation / distillation rate.

The use of Lexane to construct the solar hot boxes was good material selection, from both a forming and operations standpoint.

The 2"dia (w/8"dia floats) float valves worked well along with the application of silicone for sealing leaks. In painting the Lexane, paint was applied underneath on the back side.

Conclusions and Recommendations

Either commit to use solar in a very active way (high intensity collectors for process steam to distill with) or use a passive system to gain heat for sedimentation (in winter) and warming water.

<u>Supply</u>	<u>Relative Cost</u>	<u>% Ethyl Beer Mash</u>	<u>Potential Yield</u>
Doughnuts	Inexpensive	Card content inhibited yeast growth	Low
Jerusalem Artichoke	Inexpensive Can be harvested many times	12% on 3 days	High (Better than any other crop)
Kudzu Root	Inexpensive Too hard to harvest	8% on 4 days	Moderate to High
Cattail Roots	Inexpensive	6% on 4 days (Believe higher % obtainable)	High (Especially if harvested several times)
Bread (waste)	Inexpensive (\$8 ^{xx} /ton)	10-14% on 4 days	High (Not seasonal)
Soft Drink Soda Syrup	Moderate	High % can only be obtained after considerable alterations to stock	Medium
High Fructose Corn Syrup	Inexpensive	Great High 14% 3 days	High High

If crops are to be raised Jerusalem Artichoke is recommended

The author recommends using waste starches and sugars