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Final Report

on

✓ Solar Still

to

Dept. of Energy

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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 ridding 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" ϕ (w/ 8" ϕ 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 i.e. (High intensity
collectors for process steam to
distill with) or use a passive
system to gain heat for
seimentation (in winter)
and warming water.

<u>Supply</u>	<u>Relative Cost</u>	<u>% Etoh Beer Mash</u>	<u>Potential Yie</u>
Doughnuts	Inexpensive	Large 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} raise	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

If crops are to be raised Jerusalem Artichoke is recommended

The author recommends using waste starches and sugars