Chemistry 251 Ethanol lab Winter 2009

REPORT GUIDE Report Due: Weds March 4th.

This will not be a formal report. This report will be done in pairs.

For the report: 1) Complete the form below

Name_____ Name_____

1. Weight of CO_2 produced_____
2. What type of distillation did you use, simple of fractional?_____
3. Temperature range of the ethanol fractions you collected_____
4. Weight of ethanol you recovered_____
5. a) Density of ethanol recovered _____

   b) Percent composition, by weight of ethanol (from table pg 149)_____

6. a) Calorimetry. Calculate the heat of combustion per gram (H_g) of your ethanol—(See the end of the Biodiesel handout for equations needed to do this). Also convert your heat per gram calculation to Heat per gallon. (Hint: use the density of your ethanol) On the back of this page show your work for these conversations.

   b) How much corn (in grams) would be needed to make a gallon of ethanol?

7. Using the weight of carbon dioxide that was produced during the fermentation, calculate the weight of ethanol that should have been produced. (See Essay Biofuels, p. 144, for the balanced equation.) Based on this weight, calculate the percent recovery of ethanol that you obtained from the distillation. To do this calculation, you need to use the weight of the distillate and the percentage composition of ethanol by weight that you determined from the density determination above.

8. Given that the USA uses 390 million gallons of gas per day,[1] is pure ethanol a reliable source of fuel for large scale purposes (assuming the densities of gas and ethanol are about equal)? Corn yields are about 145 bushels/acre, [2] 1 bushel of corn = 25.40117272 kg.[3] Total farmland in the US = 938.28 million acres in 2002.[4] (Note – the superscript numbers are footnotes, not exponents)

[1] Energy Information Administration, USA DOE
[2] Iowa State University, Department of Economics
[3] http://en.wikipedia.org/wiki/Bushel
[4] http://www.ers.usda.gov/StateFacts/US.htm