NAME/TEAM: _____

<u>Fourier Transform Infrared Spectroscopy Postlab</u>
Last modified: June 17, 2014

1) Summarize your results in the following table:

v/v % MTBE in gasoline	
v/v % ethanol in vodka	
v/v % ethanol in mouthwash	

2) Based on your results, what is the proof of your vodka and the v/v% ethanol in mouthwash?

3) What was your percent relative error (% RE) for the vodka proof and mouthwash v/v%: (see the container bottles for the manufacturer's values)

$$\% \text{ RE} = \frac{\left|\text{lit. value} - \text{your value}\right|}{\text{lit. value}} \times 100$$

4) Convert your v/v % MTBE in gasoline to units of mass % (w/w %) of oxygen in gasoline. Density of MTBE = 0.74 g/mL, Density of gasoline = 0.66 g/mL, Molar Mass of MTBE = 88.15 g/mol. You may need your TA to review dimensional analysis & conversion factors for this one!

5) What was your % RE for your measured mass % of oxygen in gasoline vs. the 1990 Clean Air Act Amendment minimum value of 2 % oxygen by mass?

6) Estimate the total mass of gasoline consumed each year in the U.S. (density of gasoline is 0.66 g/mL). If ethanol was used as the oxygen additive, approximately what volume of ethanol (in gallons) would be required each year, based on your answer to #4. (density of ethanol = 0.789 g mL^{-1}; 1 gal = 3.7854 L). How many Olympic sized swimming pools would this fill (1 pool = 660,000 gal)?

7) If MTBE was phased out completely in the U.S. and replaced with ethanol as the oxygen additive to gasoline, discuss the economic and political ramifications of this change. (Approximate ethanol production in the U.S. is 14 billion gallons per year)