8th International Junior Science Olympiad
Durban, South Africa

Experimental Examination: Practical 2
Answer Sheet

7 December 2011

Complete the following:

NAME:	
SEAT NO.:	
COUNTRY:	
SIGNATURE:	

This answer sheet consists of 6 pages. Please ensure you have them all.

Name:_____
Seat Number:_____

DATA TABLE

Record as many data points as necessary.

Time/s	Temperature/°C	
	Ethanol	*Biodiesel*

[2.0 marks]

DATA PAGE

	Part 1: Ethanol	**Part 2: Biodiesel**
Initial mass of fuel + oil lamp	g	g
Final mass of fuel + oil lamp	g	g
Mass of fuel burned **[0.5 mark]**	g	g
Mass of stainless steel cup and water	g	g
Mass of empty stainless steel cup	g	g
Mass of water heated **[0.5 mark]**	g	g
Final temperature, t_2	°C	°C
Initial temperature, t_1	°C	°C
Temperature change, Δt **[1 mark]**	°C	°C

Heat, q **[2.0 marks]**	kJ	kJ
Heat of combustion, in kJ g^{-1} **[1.0 mark]**	kJ g^{-1} ethanol	kJ g^{-1} biodiesel
% efficiency **[1.0 mark]**	%	%

QUESTIONS

1. Give a balanced equation for the complete combustion of biodiesel (use the following formula for biodiesel: $C_{19}H_{34}O_2$).

Balanced Equation	$2C_{19}H_{34}O_2 + 53O_2 \rightarrow 34H_2O + 38CO_2$
	0.25 0.25 0.25 0.25

[1.0 Marks]

2. Based on your results, which fuel produces more energy per gram burned?

BIODIESEL or whatever is correct from the results

[0.25 Marks]

3. Which of the following causes the largest error:

   a. Heat lost to the surroundings.

   b. Heat gained by the stainless steel cup.

   c. Condensation on the stainless steel cup.

   d. Evaporation of the water.

[0.25 Marks]

Letter of answer:	**a**

4. Consider the following two statements:

   I. Incomplete combustion of reactants can form soot.

   II. Incomplete combustion of reactants can form carbon monoxide.

   Select the correct option.

   a. Both the statements in I and II are true.

   b. Both the statements in I and II are false.

   c. Only statement I is true.

   d. Only statement II is true.

[0.5 Marks]

Letter of answer:	**a**

Accuracy mark

Ethanol		**Biodiesel**	
Range	**Mark**	**Range**	**Mark**
9.20 - 9.60	**0.5**	**11.80 - 12.30**	**0.5**
8.80 - 9.19	**1**	**11.30 - 11.79**	**1**
8.40 – 8.79	**2**	**10.80 – 11.29**	**2**
8.00 – 8.39	**2**	**10.30 – 10.79**	**2**
7.60 – 7.99	**1**	**9.80 – 10.29**	**1**
7.20 – 7.59	**0.5**	**9.30 – 9.79**	**0.5**