## **Stage 2 Chemistry**

## **Birdwood**

HIGH SCHOOL **Topic 1: Monitoring the Environment**

**Chemists Calculating and Stoichiometry**

**Review Paper 4**

**DUE DATE:**

**Question 1**

i *Calculate the oxidation number* of the element in bold in each of the following:

a **Cu**2+ b **N**2O4 c **Cr**O42-

d **Pb** e **F**2 f H**P**O42-

ii Aluminium can be used in flash bulbs to produce an intense burst of light.

Aluminium is produced in the process. The equation for the reaction is:

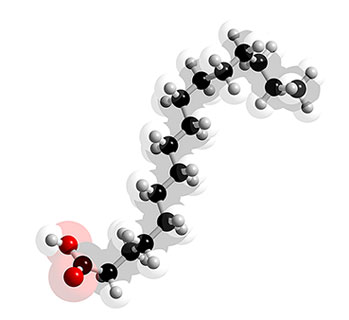
4Al(s) + 3O2(g) 2Al2O3 (s)

State the *mole ratio* of oxygen to aluminium oxide in this reaction.

iii Palmitic acid is the main component of the oil found in palm trees. [*See diagram below*.]

It has the molecular formula: CH3(CH2)14COOH.

Show by using the molar mass, that the percentage of carbon in palmitic acid is approximately 75%. (5 marks)



**Question 2**

Calculate the mass (in grams), of 0.025 mol of

iron (II) chloride, FeCl3. (3 marks) (3 marks)

**Question 3**

1.48 g of potassium carbonate, K2CO3, is dissolved in distilled water to make a solution of volume 200.0 mL.

Calculate the concentration of this solution in **mol L-1**. (3 marks)

(3 marks)

**Question 4**

Calculate the mass of copper nitrate, Cu(NO3)2 needed to

prepare 250 mL of a 0.25 mol L-1 solution. (2 marks)

**Question 5**

Calculate the number of moles in 25 mL of 2.0 molL-1 potassium chloride solution. (2 marks)

**Question 6**

The combustion of octane in excess air can be represented by the equation:

2C8H18(g) + 25O2(g) 16CO2(g) + 18H2O(l)

i State the reacting mole ratio of octane, C8H18, to carbon dioxide.

ii Hence find the mass of octane, in grams, that would be needed to be burnt to produce 1000 g of CO2.

(4 marks)

**Question 7**

*Credit will be given for the correct use of significant figures in answers to question 7.* (1 mark)

The process of respiration can be represented by the equation:

C6H12O6 (aq) + 6O2(g) 6CO2(g) + 6H2O(l)

i Calculate the mass of glucose, C6H12O6, required to prepare 200.0 mL of a solution with a

concentration of 0.200 mol L-1.

ii When a 10.0g glucose tablet completely reacts with oxygen according to the equation above,

calculate the mass of water produced.

iii If the density of water is approximately 1.00 gmL-1,

convert the mass of water produced in part ii to a volume in mL. (6 marks)

**Question 8**

Consider the reaction represented by the *unbalanced* equation:

Ag(s) + HNO3(aq) AgNO3(aq) + NO2(g) + H2O(l)

i Balance the equation.

ii Name *one* of the reactants.

iii Calculate the mass of silver that would react with 50.0 mL of 2.50 M HNO3.

iv Calculate the volume of 2.50 M HNO3 that would be needed to react with 100.0 g of silver.

(8 marks)

**TOTAL MARK = 34**