2001 HIGHER SCHOOL CERTIFICATE EXAMINATION

Chemistry

Section I – Part B (continued)

Marks

Question 25 (6 marks)

Explain the need for monitoring the products of a chemical reaction such as combustion. **6**

This is to ensure that the combustion reaction is complete and not incomplete, so that sufficient amount of oxygen reacts with the reactant (eg. octane or ethanol) to form carbon dioxide and water, and not carbon monoxide or solid carbon (soot) and water.

Complete combustion:

$$2C_8H_{18} + 25O_2 \longrightarrow 16CO_2 + 16H_2O$$

Incomplete combustion:

$$C_8H_{18} + \frac{25}{2}O_2 \longrightarrow 8CO + 8H_2O$$

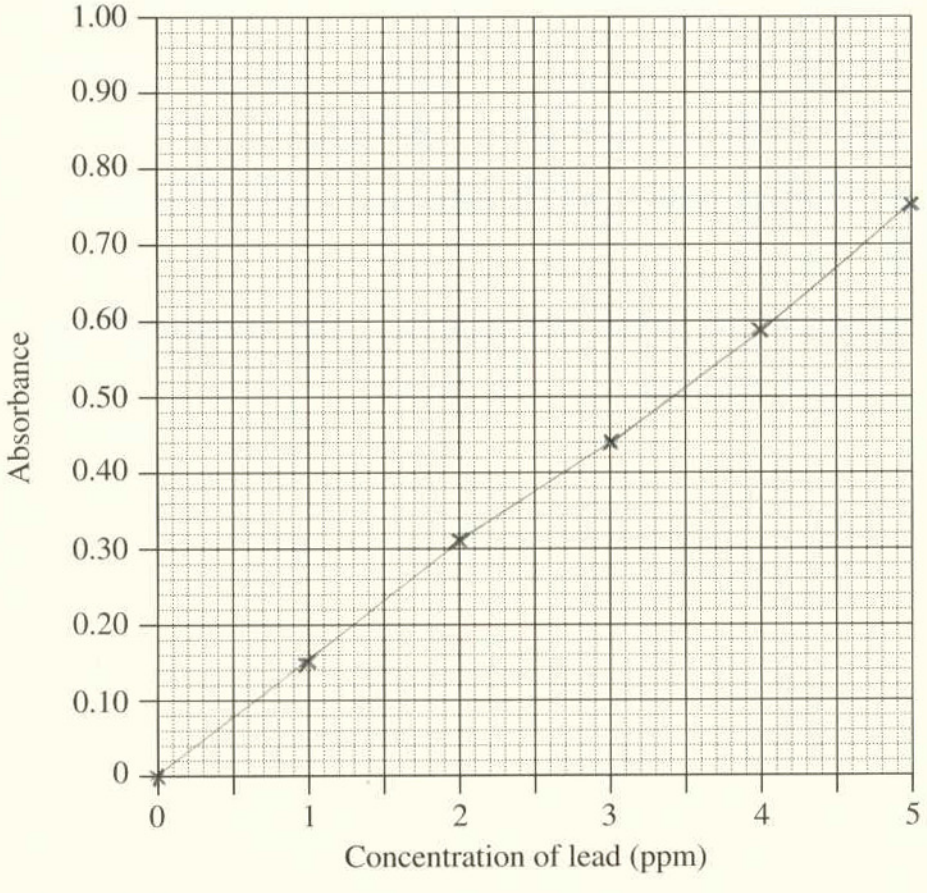
Marks

Question 26 (4 marks)

A university student decided to measure the concentration of lead (Pb) in the soil around his home. He prepared five standard lead solutions of known concentration. The absorbance of these solutions was measured. These results are shown in the table.

Concentration of lead standard (ppm)	*Absorbance*
0	0.00
1	0.15
2	0.31
3	0.44
4	0.59
5	0.75

(a) Draw a line graph of these data. **1**



Question 26 continues on page 23

Marks

Question 26 (continued)

(b) The student prepared solutions from four different soil samples around his home. These solutions were also analysed using the same method. The results are shown in the table. **1**

Solutions made from soil samples	
Area sampled	*Absorbance*
Front garden bed	0.19
Back garden bed	0.09
Mail box	0.22
Back fence	0.11

Determine the highest concentration of lead in the soil around the home.

Around the mail box with about 1·4ppm concentration.

(c) State an hypothesis to account for the variation in lead concentration around the student's home. **2**

The addition of other soils in the garden decreases the amount of Pb so plants can grow. The mail box doesn't need this, hence the more Pb concentration.

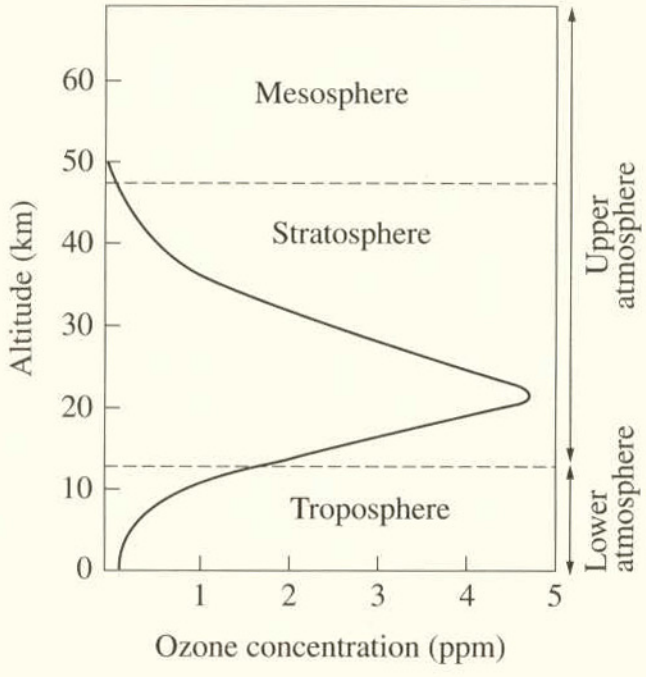
End of Question 26

Please turn over

Marks

Question 27 (4 marks)

Oxygen exists in the atmosphere as the allotropes oxygen and ozone. The graph shows a typical change in ozone concentration with changing altitude. **4**



Compare the environmental effects of the presence of ozone in the upper and lower atmosphere.

In the Troposphere (lower atmosphere) the O_3 concentration is very low at that is where life form is present and O_2 and other gases is present.

In the Stratosphere (upper atmosphere) the high level of O_3 concentration is required at that altitude to absorbe UV radiation admited by the sun which is not so much is required in the lower atmosphere and beyond the altitude of 50km O_3 is not required to be present.