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**

Monitoring the products of a chemical reaction such as combustion are important, as the products may be directly harmful or have detrimental repercussions when mixed with other compounds. In complete combustion the only products are $CO_{2(g)}$ and $H_2O_{(l)}$ which are relatively harmless, as long as $CO_{2(g)}$ levels don't become excessive. In incomplete combustion, air pollution occurs through photochemical smog (which carry many particulates such as excess Carbon), ozone depleting gases may also form such as nitrogen dioxide. As well as poisonous gases such as $SO_{2(g)}$ (from smelting of ores) and $NO_{x(g)}$ from vehicle emissions which can all lead to acid rain – a major issue in some countries, as it effects the aquamarine ecosystem as well as destroys many forests and monuments especially marble, limestone, etc.

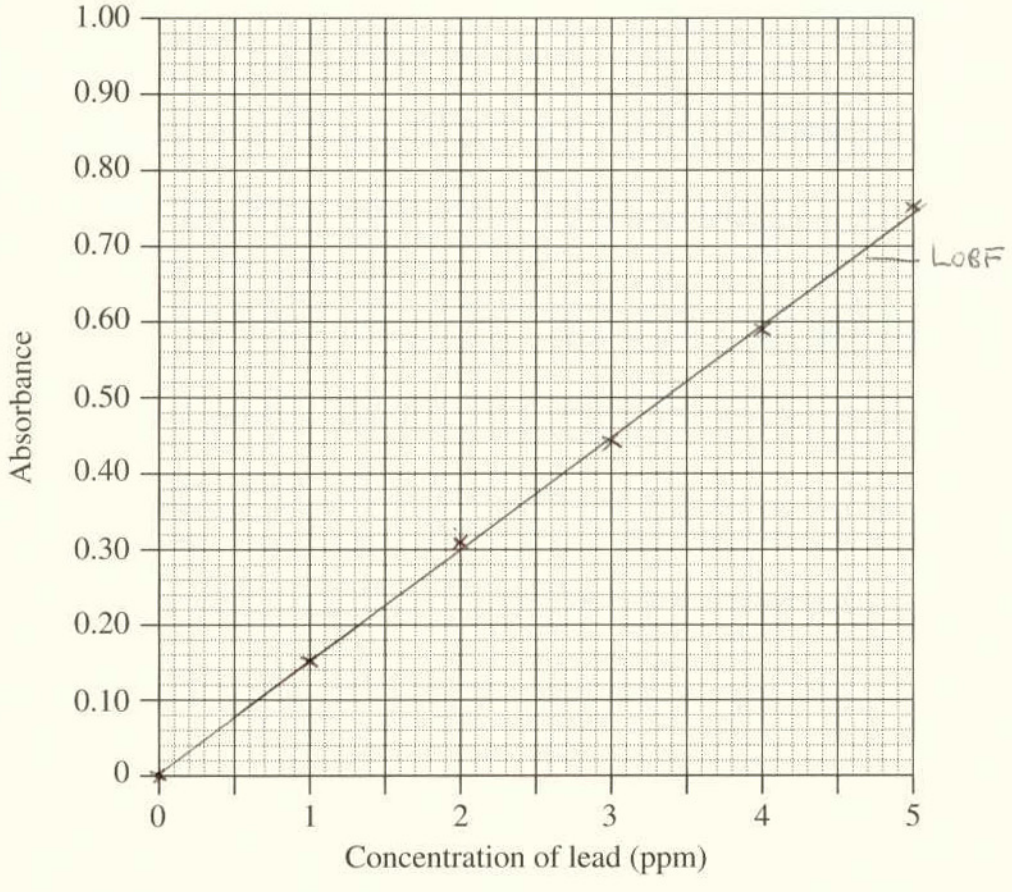
Marks

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.

Mail box : ≃ 1.5 ppm

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

At one point, Lead additives were common in paint. Lead leaking from paint could give [Pb] in the soil. A sloping block of land accompanied by rainfall and leaching accounts for front/backyard differences. If the mailbox was painted with Lead-based paint, this would account for the high concentration.

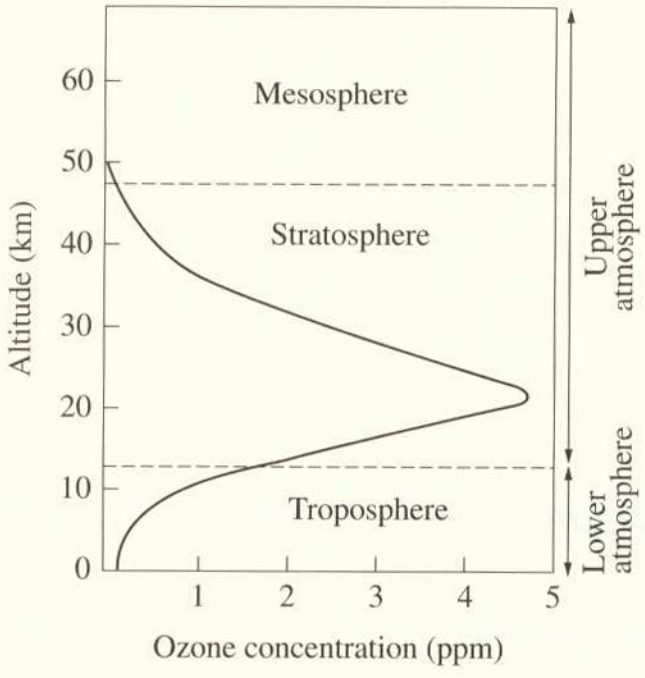
End of Question 26

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.

Ozone in the lower atmosphere with concentration of as low as 0.02 ppm would cause breathing difficulties and death. Ozone present in the lower atmosphere destroy living organism and toxic to human lives. However, in the upper atmosphere, ozone concentration increases more and it acts as radiation shields because it filters u.v light preventing it from coming to the lower atmosphere and hence our Earth to affect living organisms.