

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

For the combustion of fossil fuels, oxygen is necessary for the formation of carbon dioxide. If no oxygen is present, soot will be formed, which is simply carbon. This soot is black and is more harmful to the environment than CO_2 . It may coat buildings, living organisms and plant life. If this plant life is covered with a layer of carbon it may not be able to perform the essential process of photosynthesis. This would result in a major loss in plant life in areas surrounding the fuel combustion plant. By monitoring the products of chemical reactions such as these, we can ensure that the reactants and catalyst are working correctly to produce the desired product. When soot is observed to have been formed in this reaction it is obvious that the supply of oxygen to the fuel is not high enough.

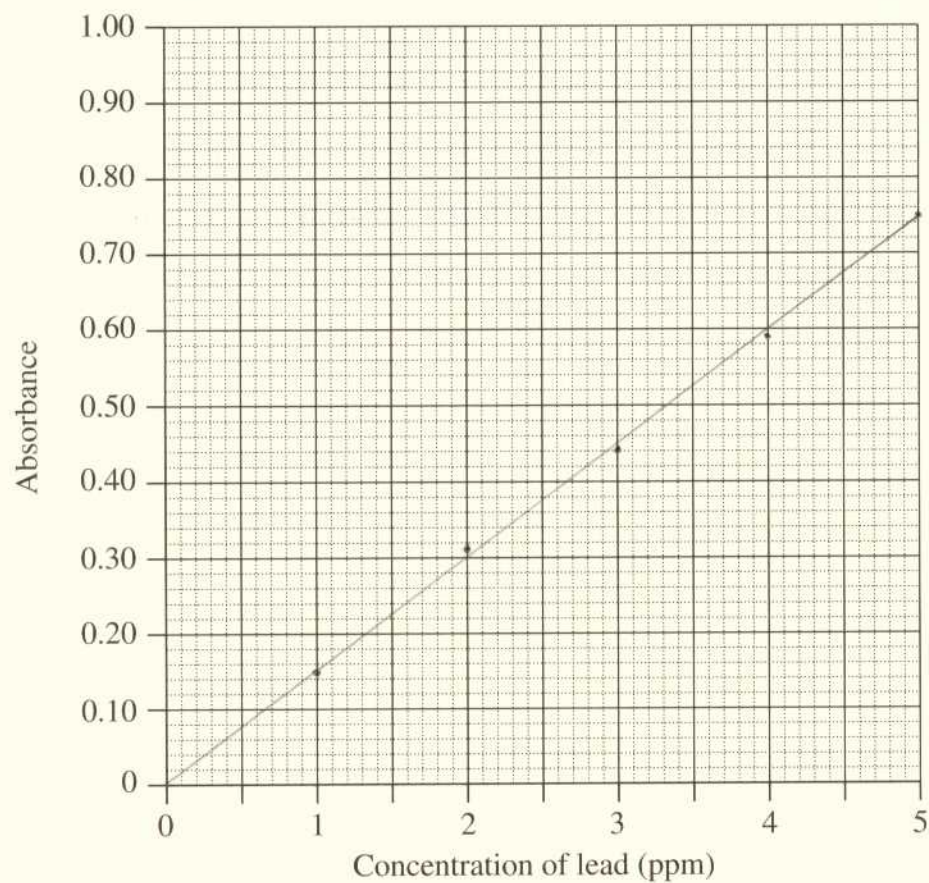
Question 26 (4 marks)

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.

<i>Concentration of lead standard (ppm)</i>	<i>Absorbance</i>
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

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

<i>Solutions made from soil samples</i>	
<i>Area sampled</i>	<i>Absorbance</i>
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.

..... ≈ 1.5 ppm at 0.22 absorbance (mail box)

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

The lead could have been produced from the paint where it is a lead-based paint. The plants may be greater also at the back where it has soaked up the lead whereas at the front there may be little abundance of plants.

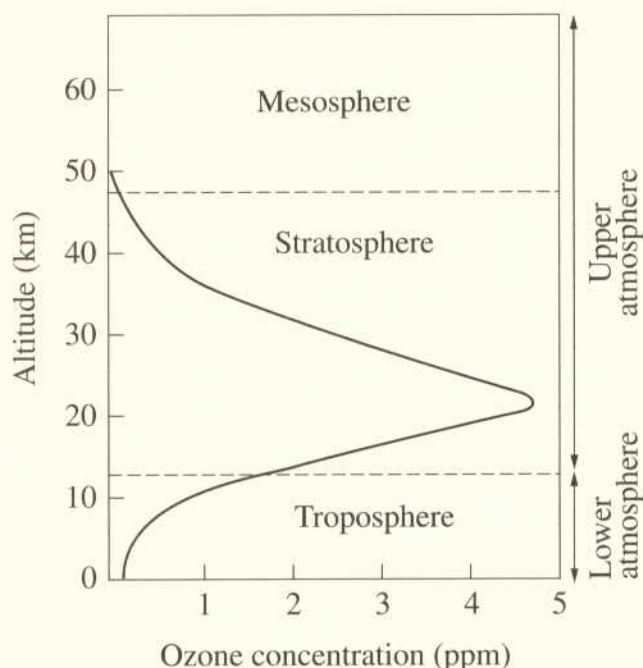
End of Question 26

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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 upper atmosphere, ozone is beneficial. It forms the ozone layer around the earth, deflecting most of the dangerous UV-rays from the sun.

However, in the lower atmosphere, ~~the~~ and troposphere, ozone is considered a pollutant. It is extremely dangerous, and is poisonous, reacting with organic tissue. It ~~is~~ has increased in abundance because of CFC's, photochemical smog, increased nitrates.