NAME	**INDEX NUMBER**
SCHOOL	**DATE**

GAS LAWS

1. 1994 Q1b P2

What determines the quality of a musical note?

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2. 1996 Q30 P1

What is the value of -20^{0}C on the absolute temperature scale?

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3. 1998 Q25 P1

Fig 7 shows a graph of pressure P, against volume, V, for a fixed mass of gas at constant temperature.

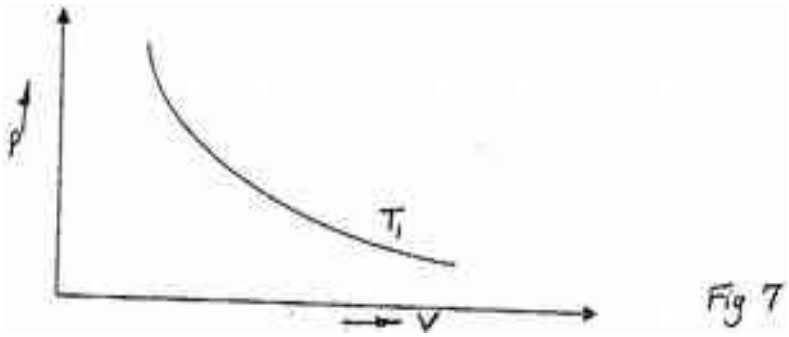

Fig 7

Sketch on the same axes a graph for the same mass of gas with a temperature T_2 lower than T_1

4. 1998 Q26 P1

State two factors that would raise the boiling point of water to above 100^{o}C

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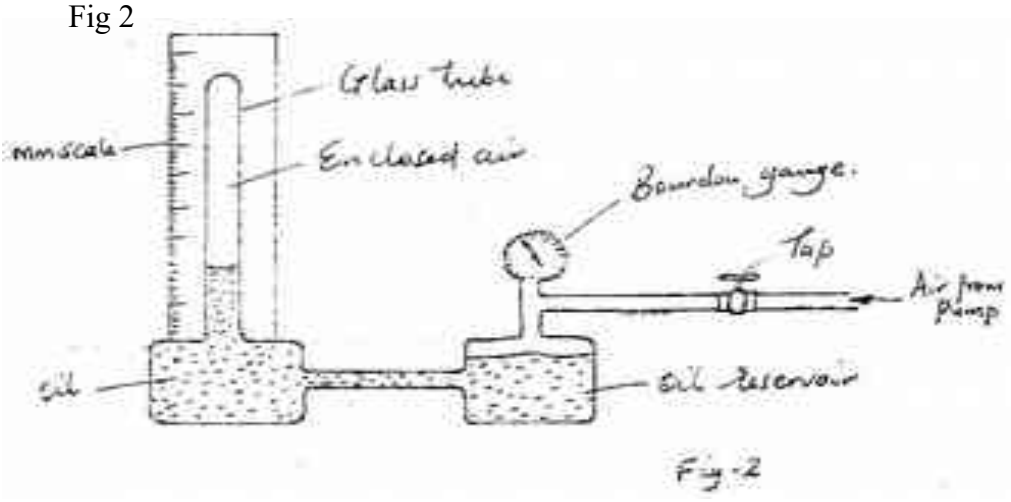
5. 1998 Q3b P2

b) Figure 2 shows a set-up that may be used to verify Boyle's law.

Fig 2



i) Describe the measurements that should be taken in the experiment

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ii) Explain how the measurements taken in (i) above may be used to verify Boyle's law.

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6. 1999 Q27 P1

Determine the pressure required to compress a gas in a cylinder initially at 20^0C and at a pressure 1.03×10^{-5} to one-eight of its original volume.

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7. 2000 Q3 P2

(a) Using the kinetic theory of gases, explain how a rise in the temperature of a gas causes a rise in the pressure of the gas if the volume is kept constant.

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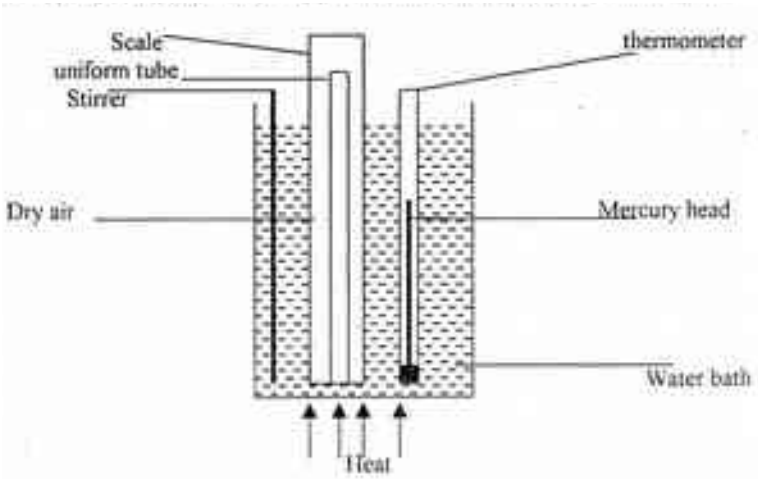
b) **Fig. 5** shows a set up that may be used to verify Charles Law.
Figure 5.



i) State the measurements that should be taken in the experiment.

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ii) Explain how the measurements taken in (i) above, may be used to verify Charles Law.

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iii) What is the purpose of the water bath.

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8. 2001 Q24 P1

Two identical containers A and B are placed on a bench. Container A is filled with oxygen gas and container B with hydrogen gas such that the two gases have equal masses. If the containers are maintained at the same temperature state with reason the container in which the pressure is higher.

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9. 2001 Q3b P2

Small quantities of hydrogen and helium gas at the same temperature are released simultaneously at one end of a laboratory. State with reasons which gas is more likely to be detected earlier at the other end?

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10. 2001 Q7 P2

a i) State the pressure law of an ideal gas.

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ii) The pressure p, of a fixed mass of a gas at constant temperature T= 300K is varied continuously. The corresponding values of P and the volume V of the gas are shown in table 2.

Pressure, p(x 10^5Pa)	2.00	2.50	3.00	3.50	4.00	4.50
Volume, V (m^3)	0.025	020	0.017	0.014	0.012	0.011

Given that $P^V = 2RT$ where R is a constant, plot an appropriate graph and use it to determine r.

I/P x 10^5 (pa -1)	0.5	0.40	0.33	0.29	0.25	0.22
I/V (M^3)	40.0	5	58.8	71.4	83.3	90.0

b) A tin closed with an airtight lid contains air at a pressure of 1.0 x 10^{5+} Pa and temperature of 12 ^{0}C. The tin is heated in a water bath until the lid opens. If

the temperature at which the lid opens is 88^0C, determine the pressure attained by the gas. (Ignore expansion of the tin).

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11. 2002 Q6 P1

When an inflated balloon is placed at equal in a refrigerator it is noted that its volume reduces. Use the kinetic theory of gases to explain this observation.

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12. 2002 Q6 P2

a) State the law that relates the volume of a gas to the temperature of a gas.

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b) **Fig 7**. shows an experiment set-up that may be used to investigate one of the laws. The glass tube has a uniform bore and it is graduated in millimeters

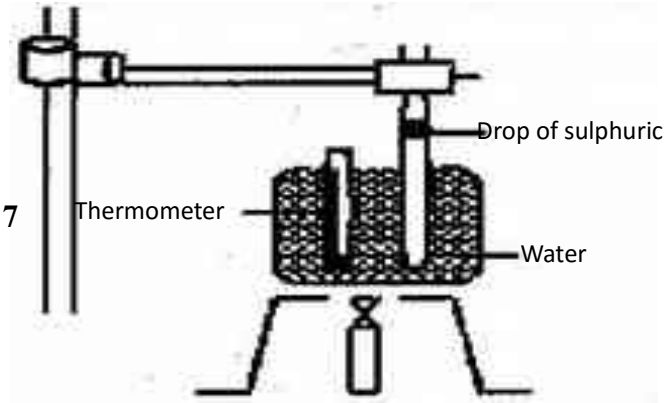

figure 7

i) Describe how the experiment was carried out and explain how the results obtained verify the law.

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ii) Limitations of the set up are?

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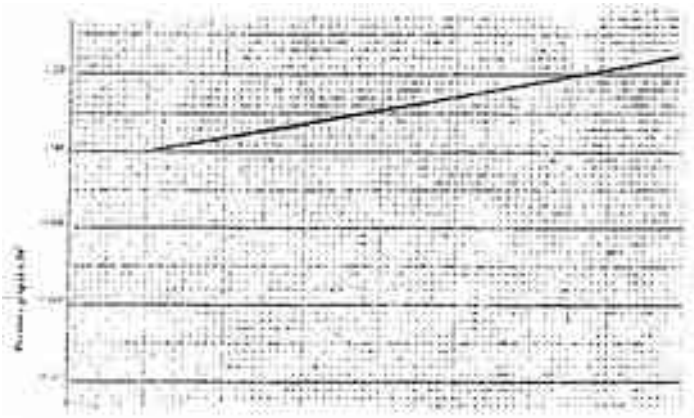
c) In an experiment to find the relation between pressure, p, and temperature, θ, of a gas at a constant volume, values of temperature were determined. The results obtained are shown in the graph below.



(i) From the graph, determine the pressure at a temperature of 273K.

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(ii) Assuming the relation $p/T_0+\theta$ = constant holds for this graph determine the value of the constant T_0

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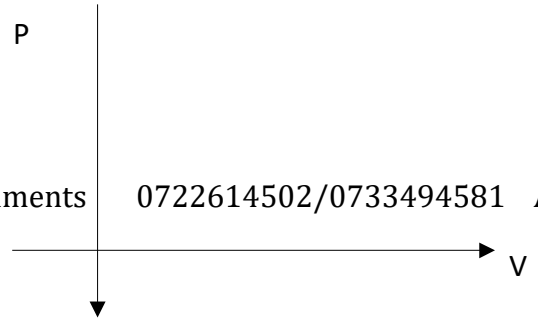
13. 2002 Q22 P1

On the axes provided sketch the P-V graph for a gas obeying Boyle's law.



14. 2003 Q24 P1

On the axes provided in **Fig. 13**, sketch a graph of pressure(p) against reciprocal of volume($^1/_V$) for a fixed mass of an ideal gas at constant temperature.

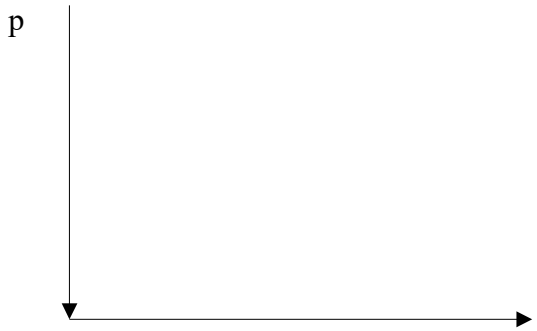
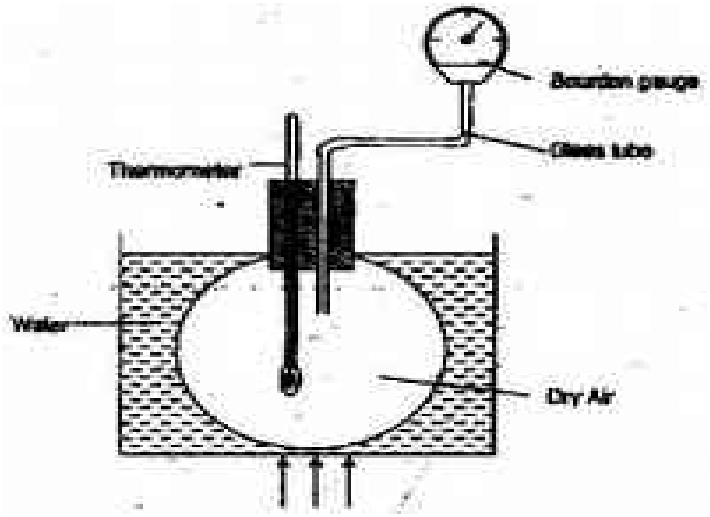


fig. 13

15. 2003 Q6 P2

a) Figure 6 shows a simple set up for pressure law apparatus.



Describe how the apparatus may be used to verify pressure law. Initial reading of pressure and temperatures are recorded.

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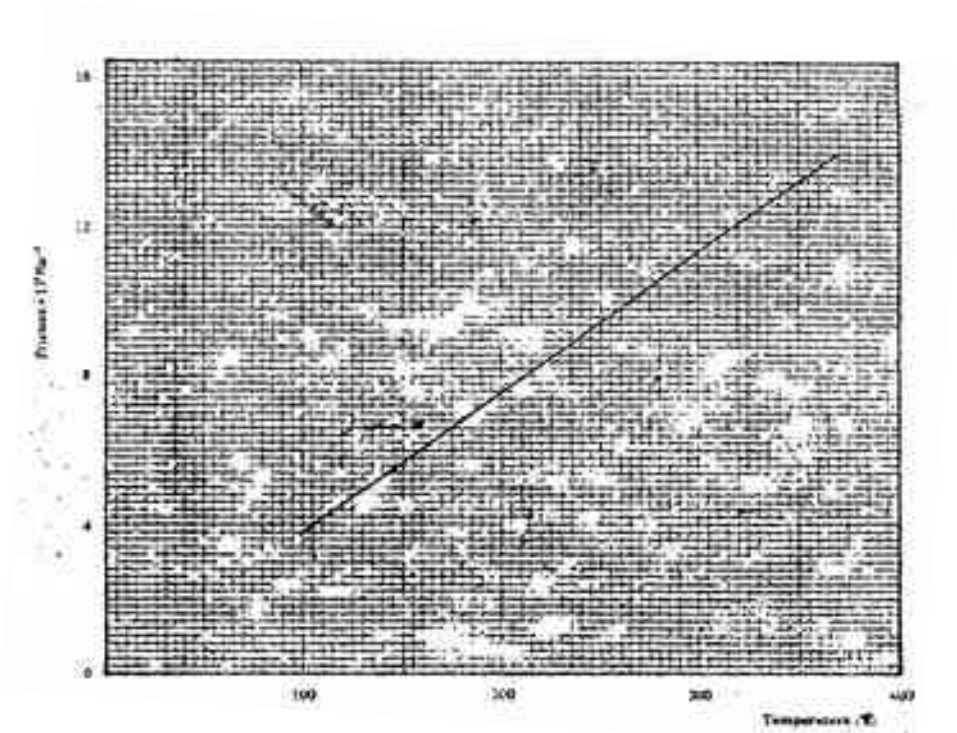
b) The graph in **fig 7** shows the relationship between the pressure and temperature for a fixed mass of an ideal gas at a constant volume.



(i) Given that the relationship between pressure, p, and temperature, T n Kelvin is of the form P = kT+ C where k and C are constants, determine from the graph, values of k and c.

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(ii) Why would it be impossible for pressure of the gas to reduced to zero in practice?

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(c) A gas is put into a container of fixed volume at a pressure of 2.1×10^5 Nm^{-2} and temperature 27^0C. the gas is then heated temperature of 327^0C. Determine the new pressure.

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16. 2004 Q27 P1

A balloon is filled with air to volume of 200ml at a temperature of 293K. Determine the volume when the temperature rises to 353K at the voltmeter, V.

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17. 2006 Q9 P1

On the axes provided sketch the graph of pressure P against volume V for a fixed mass of an ideal gas. (1 mark)

18. 2006 Q16 P1

(a) State what is meant by an ideal gas (1 mark)

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(a) The pressure acting on a gas in a container was changed steadily while the temperature of the gas maintained constant. The value of volume V of the gas was measured for various values of pressure. The graph in figure 9 shows the relation between the pressure, p and the reciprocal of volume $\frac{1}{V}$

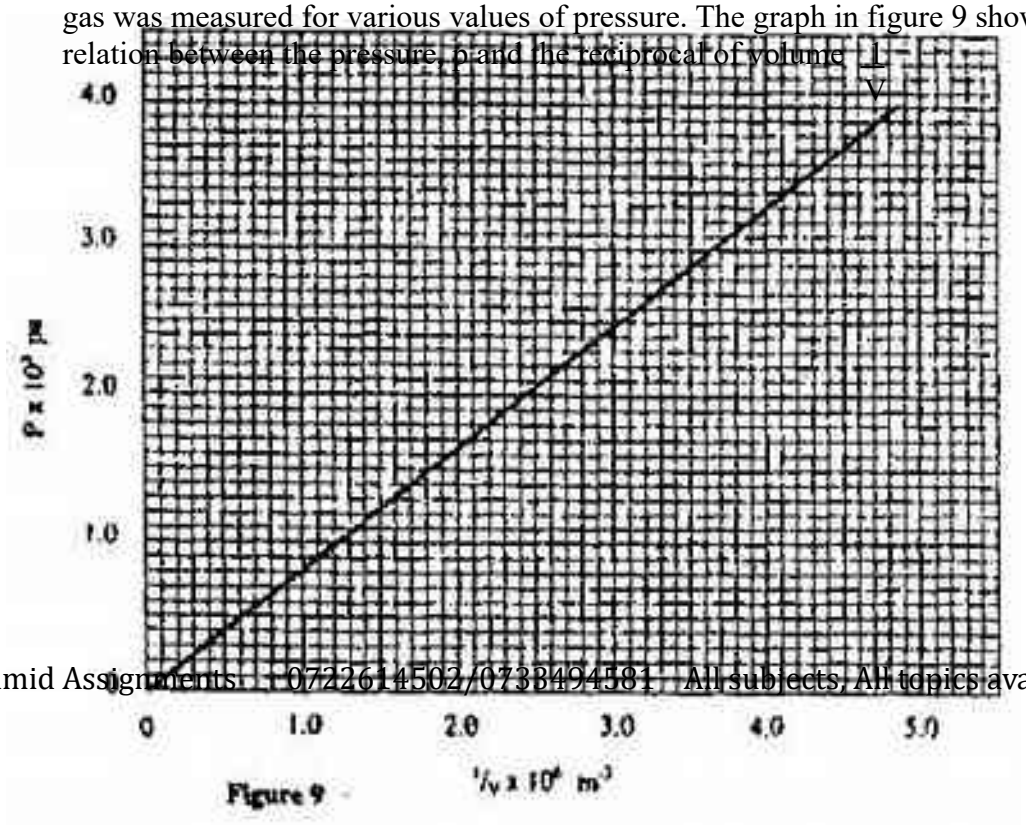

Figure 9

(i) Suggest how the temperature of the gas could be kept constant

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(ii) Given that the relation between the pressure P_1 and the volume, V_1 of the gas is given by $PV = k$
When k is a constant, use the graph to determine the value of k.

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(iii) What physical quantity does k represent? (4 marks)

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(iv) State one precaution you would take when performing such an experiment (1 mark)

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(c) A gas occupies a volume of 4000 litres at a temperature of 37^0C and normal atmospheric pressure. Determine the new volume of the gas if it heated at constant pressure to a temperature of 67^0C (normal atmospheric pressure P= 1.01×10^5 pa)

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19. 2007 Q12 P1

The graph in **figure 7** shows the relationship between the pressure and temperature for an ideal gas. Use the information in the figure to answer questions 12 and 13

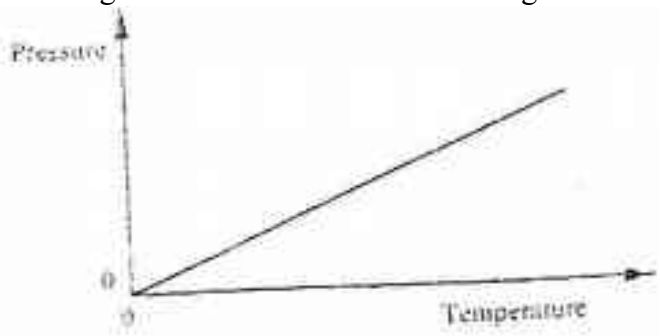

Figure 7

12. State the unit of the horizontally axis (1 mark)

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13. Write a statement of the gas law represented by the relationship (1 mark)

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20. 2008 Q17 P1

a) What is meant by absolute zero temperature? (1 mark)

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b) **Fig. 10** shows a set up to investigate the relationship between temperature and volume for a certain gas.

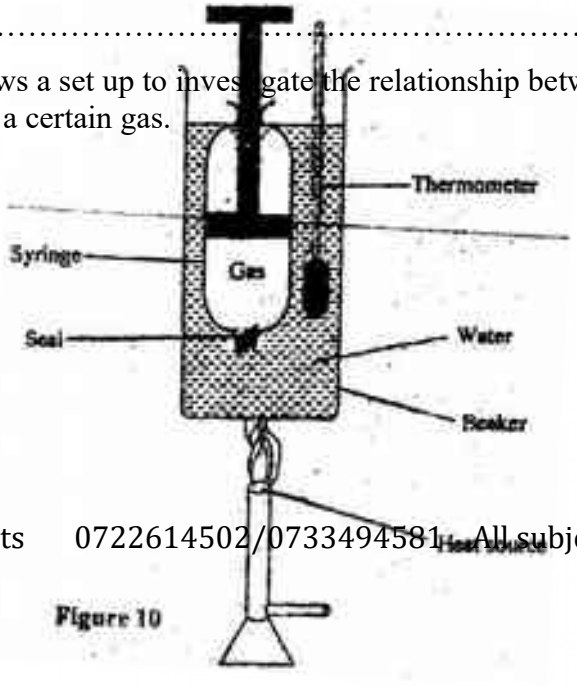

Figure 10

b) State two factors that are kept constant, in order to determine the relationship. (2 marks)

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c) The graph in Fig. 11 shows the relationship between volume and temperature for the experiment.

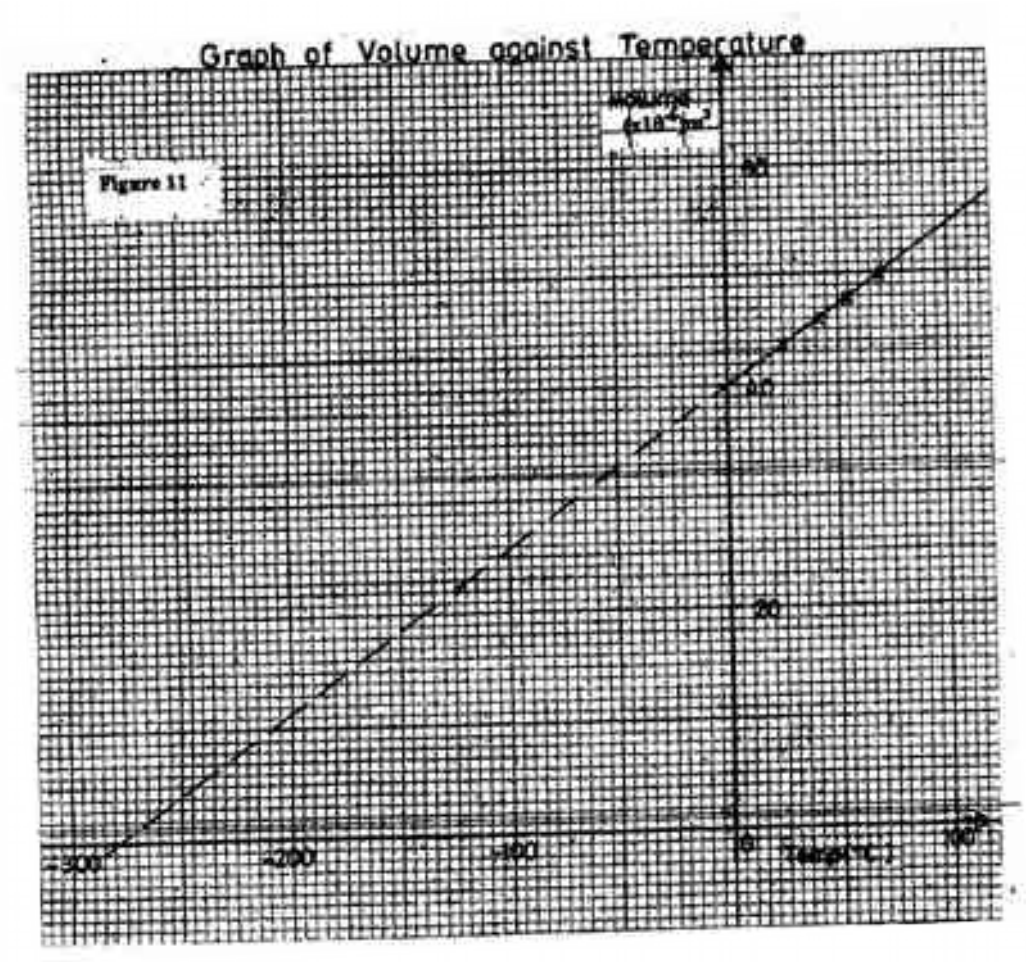

Figure 11

(i) What was the volume of the gas at 0^0C? (1 mark)

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(ii) At what temperature would the volume of the gas be zero? (1 mark)

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(iii) Explain why the temperature in part (ii) above cannot be achieved. (2 marks)

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d) A sealed gas cylinder contains 300cm^3 of certain gas at a temperature of 25^{0}C, and at a pressure of 9.5x 10^{4}pa. the gas in the cylinder was then cooled to 10^{0}C. Determine the new pressure of the gas in the cylinder. (4 marks)

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21. 2009 Q13 P1

State what is meant by absolute zero temperature (Zero Kelvin or -273°C). (1 mark)

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22. 2009 Q18 P1

(a) State the pressure law for an ideal gas. (1 mark)

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(b) An air bubble is released at the bottom of a tall jar containing a liquid. The height of the liquid column is 80cm. The volume of the bubble increases from 0.5 cm^3 at the bottom of the liquid to 1.15 cm^3 at the top. **Figure 11** shows the variation of pressure, P, on the bubble with the reciprocal of volume $1/v^3$ as it rises in the liquid.

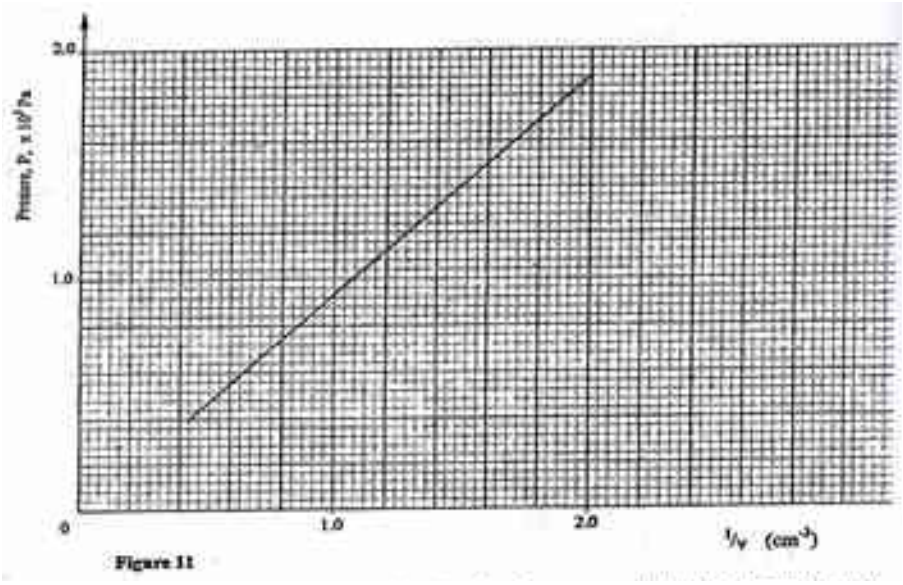

Figure 11

(i) State the reason why the volume increases as the bubble rises in the liquid column (1 mark)

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(ii)From the graph, determine the pressure on the bubble:

(I) at the bottom of liquid column; (2 marks)

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(II) at the top of the liquid column (1 mark)

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(iii) Hence determine the density of the liquid in kgm^3 (3 marks)

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(iv) What is the value of the atmospheric pressure of the surrounding?

(1 mark)

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(c) A rubber tube is inflated to pressure of 2.7 x 105 Pa and volume 3800 cm^3 at a temperature of 25°C. It is then taken to another place where the temperature is 15^0C and the pressure 2.5 x 10^5 pa. Determine the new volume. (4 Marks)

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23. 2011 Q17 P1

(a) When temperature of water reaching the boiling point, bubbles rise to the surface.

(i)State what is contained in the bubbles. (1 mark)

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(ii)State the reasons why bubbles rise to the surface only at the boiling point

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24. 2012 Q8 P1

In verifying the pressure law of gases, the temperature and pressure of a gas are varied at constant volume. State the condition necessary for the law to hold. (1 mark)

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