

NAME _____ INDEX NUMBER _____

SCHOOL _____ DATE _____

GAS LAWS

1. 1989 Q32f

X grams of sodium carbonate (Na_2CO_3)_(s) reacted completely with 30cm^3 of dilute hydrochloric acid to product 672cm^3 of carbon dioxide gas at S.T.P

(1 mole of gas occupies 22.4L at S.T.P, C = 12.0, O = 16.0, Na = 23.0) (1mark)

(i) Write the equation for the reaction (1mark)

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(ii) Calculate the concentration of the acid in moles per litre (2marks)

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(iii) Calculate the value of X (2marks)

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2. 1991 PP1A Q 1

Calculate the relative formula mass of gas **A** given that the time taken for equal volumes of oxygen to diffuse through the use same hole is 20 seconds and 24 seconds respectively

(O=16.0) (2 marks)

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3. 1995 Q19

A mixture containing equal volumes of hydrogen and carbon dioxide was introduced one end of a tube as shown below.



Which gas would be detected at appoint C in first? Explain

(2marks)

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4. 1996 Q2

A fixed mass of a gas has a volume of 250cm^3 at a temperature of 27°C and 750mm Hg pressure. Calculate the volume the gas would occupy at 42°C

(2marks)

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5. 1997 Q16, 27

16. A gas occupies a volume of 400cm^3 at 500k and 1 atmosphere pressure. What will be the temperature of the gas when the volume and pressure of the gas is 100cm^3 and 0.5 atmospheres respectively.

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27. Calculate the mass of nitrogen dioxide gas that would occupy the same volume as 10g of hydrogen gas at same temperature and pressure. ($\text{H} = 1.0$, $\text{N} = 14.0$, $\text{o} = 16.0$)

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6. 1998 Q 23

A sealed glass tube containing air at s.t.p was immersed in water at 100°C . Assuming that there was no increase in the volume of the glass tube due to the expansion of the glass, calculate the pressure of the inside tube. (standard pressure = 760mmHg.)

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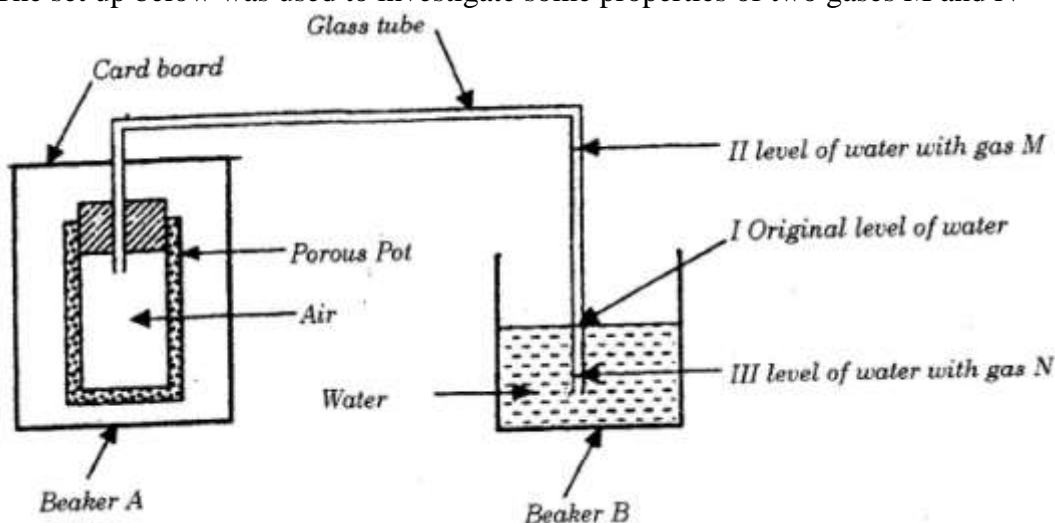
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7. 1999 Q 20

The set up below was used to investigate some properties of two gases M and N



When beaker A was filled with gas M, the level of water in the glass tube rose to point II. When the experiment was repeated using gas N, the level of water dropped to point III. Explain these observations.

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8. 2000 Q 18

A given volume of ozone, (O_3) diffused from a certain apparatus in 96 seconds. Calculate the time taken by an equal volume of carbon dioxide (CO_2) to diffuse under the same conditions ($\text{O} = 16.0$, $\text{C} = 12.0$)

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9. 2003 Q 14

A few crystals of potassium permanganate were carefully placed into water in a beaker at one spot. The beaker was left undisturbed for two hours.

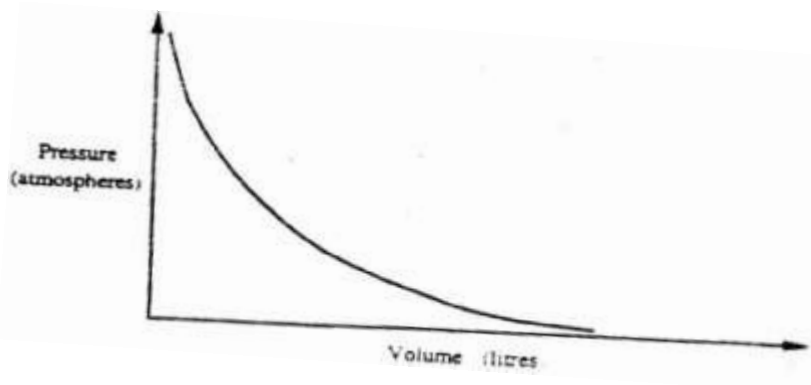
State and explain the observation that was made.

(2marks)

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10. 2003 Q 25

The graph below shows the behaviour of a fixed mass of a gas at constant temperature.



a) What is the relationship between the volume and the pressure of the gas?

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b) 3 litres of oxygen gas at one atmosphere pressure were compressed to two atmospheres at constant temperature. Calculate the volume occupied by the oxygen gas

(2marks)

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11. **2006 Q 3**
60cm³ of oxygen gas diffused through a porous partition in 50 seconds.
How long would it take 60cm³ of sulphur (IV) oxide gas to diffuse through
the same partition under the same conditions? (S= 32.0, O = 16.0) (3marks)

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12. **2006 Q 3c P2**
When 3 litres of chlorine gas were completely reacted with element
D, 11.875g of the product were formed. Determine the relative atomic
mass of element D. (Atomic mass of chlorine = 35.5; molar gas volume = 24litres).
(3marks)

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13. **2007 Q 12**
a) State the Charles law (1mark)

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b) The volume of a sample of nitrogen gas at a temperature of 291 K and 1.0×10^5
Pascal's was $3.5 \times 10^{-2} \text{m}^3$. Calculate the temperature at which the volume of the gas
would be $2.8 \times 10^{-2} \text{m}^3$ at 1.0×10^5 Pascal. (2marks)

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14. **2008 Q 1b P2**
b) A sample of biogas contains 35.2% by mass of methane. A biogas
cylinder contains 5.0 kg of the gas.
Calculate the;
(i) Number of moles of methane in the cylinder. (Molar mass of methane=16)
(2marks)

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- (ii) Total volume of carbon (IV) oxide produced by the combustion of methane in the cylinder (Molar gas Volume= 24.0 dm^3 at room temperature and pressure). (2marks)

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15. 2008 Q 20

- a) State the Graham's law diffusion. (1mark)

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- b) The molar masses of gases W and X are 16.0 and 44.0 respectively. If the rate of diffusion of W through a porous material is $12 \text{ cm}^3 \text{ s}^{-1}$ calculate the rate of diffusion of X through the same material. (2marks)

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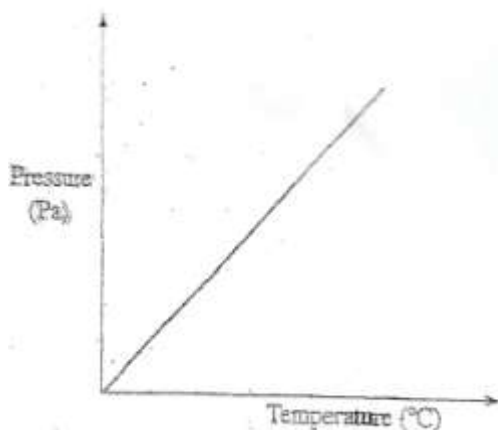
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16. 2009 Q 26

The graph below shows the relationship between pressure and the temperature of a gas in a fixed volume container



- (a) State the relationship between pressure and temperature that can be deduced from the graph.

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(b) Using kinetic theory, explain the relationship shown in the graph (2 marks)

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17. 2010 Q 8

The pressure of nitrogen gas contained in a 1dm^3 cylinder at -196°C was 10^7 Pascals.

Calculate the:

a) Volume of the gas at 25°C and 10^5 Pascals. (1 ½ marks)

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b) Mass of nitrogen gas(Molar volume of gas is 24dm^3 , $N = 14.0$) (1 ½ marks)

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18. 2011 Q 6

A certain mass of gas occupies 0.15dm^3 at 293K and $98,648.5\text{ Pa}$.

Calculate its volume at 101325 Pa and 273K (2 marks)

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19. 2011 Q 25

a) State the Gay Lussac's Law. (1 mark)

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b) 10 cm^3 of a gaseous hydrocarbon, C_2H_x required 30cm^3 of oxygen for complete combustion. If steam and 20cm^3 of carbon (IV) oxide were produced, what is the value of X? (2 marks)

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20. 2012 Q5 P1

A sample of water in a beaker was found to boil at 101.5 °C at 1 atmosphere pressure. Assuming that the thermometer was not faulty, explain this observation. (1 mark)

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21. 2012 Q11 P1

The empirical formula of A is CH₂Br. Given that 0.40g of A occupies a volume of 56cm³ at 546K and 1 atmosphere pressure, determine its molecular formula. (H = 1.0, C = 12.0, Br = 80.0, molar gas volume at STP = 22.4dm³) (3 marks)

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