Gas laws

1. A sample of unknown compound gas **X** is shown by analysis to contain Sulphur and Oxygen. The gas requires 28.3 seconds to diffuse through a small aperture into a vacuum. An identical number of oxygen molecules pass through the same aperture in 20seconds. Determine the molecular mass of gas X (O= 16, S= 32)

2. (a) State Graham's Law of diffusion
   (b) Gas **V** takes 10 seconds to diffuse through a distance of one fifth of a meter. Another gas **W** takes the same time to diffuse through a distance of 10 cm. if the relative molecular mass of gas **V** is 16.0; calculate the molecular mass of **W**

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

4. $60 \ cm^3$ of oxygen gas diffused through a porous partition in 50 seconds. How long would it take $60 \ cm^3$ of sulphur (IV) oxide gas to diffuse through the same partition under the sane conditions? (S = 32.0, O = 16.0)

5. (a) State Graham's law of diffusion
   (b) $30cm^3$ of hydrogen chloride gas diffuses through a porous pot in 20seconds. How long would it take $42cm^3$ of sulphur(IV) oxide gas to diffuse through the same pot under the same conditions   (H =1   Cl = 35.5   S = 32   O =16)

6. a) State **Boyles law**
   b) Sketch a graph that represents Charles' law
   c) A gas occupied a volume of $250cm^3$ at -23°C and 1 atmosphere. Determine its volume at 127°C when pressure is kept constant.

7. A factory produces Calcium Oxide from Calcium Carbonate as shown in the equation below:-

   $CaCO_{3\ (s)} \qquad CaO_{\ (s)} + CO_{2\ (g)}$
   (a) What volume of Carbon (IV) Oxide would be produced from 1000kg of Calcium Carbonate at s.t.p (Ca = 40, C = 12, O = 16, Molar gas volume at s.t.p = $22.4dm^3$)

8. A fixed mass of gas occupies $200cm^3$ at a temperature of 23°C and pressure of 740mmHg. Calculate the volume of the gas at -25°C and 780mmHg pressure

9. Gas **K** diffuses through a porous material at a rate of $12cm^3 \ s^{-1}$ where as **S** diffuses through the same material at a rate of $7.5cm^3 s^{-1}$. Given that the molar mass of **K** is 16, calculate the molar mass of **S**

10. (a) State Gay Lussac's law

. 11. (a) What is the relationship between the rate of diffusion of a gas and its molecular mass?
   (b) A sample of Carbon (IV) Oxide takes 200 seconds to diffuse across a porous plug. How long will it take the same amount of Carbon (II) Oxide to diffuse through the same plug?(C=12, O=16)
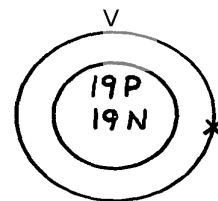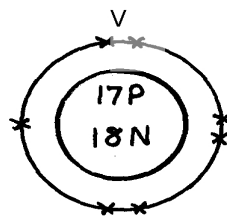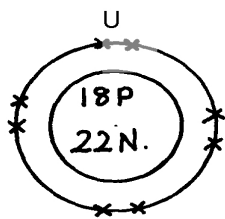
12. Below are structures of particles. Use it to answer questions that follow. In each case only electrons in the outermost energy level are shown

key
P = Proton
N = Neutron
X = Electron

U: 18P 22N.
V: 17P 18N
V: 19P 19N

(a) Identify the particle which is an anion
(b) Choose a pair of isotopes. Give a reason

13. The figure below shows two gases **P** and **Q** diffusing from two opposite ends 18 seconds after the experiment

(a) Which of the gases has a lighter density?
(b) Given that the molecular mass of gas **Q** is 17, calculate the molecular mass of **P**

14. Identify the particles that facilitate the electric conductivity of the following substances
(i) Sodium metal
(ii) Sodium Chloride solution
(iii) Molten Lead Bromide

15. Gas **B** takes 110 seconds to diffuse through a porous pot, how long will it take for the same amount of ammonia to diffuse under the same conditions of temperature and pressure? (RMM of **B** = 34 RMM of ammonia = 17)

16. A gas occupies 5dm^3 at a temperature of -27°C and 1 atmosphere pressure. Calculate the volume occupied by the gas at a pressure of 2 atmospheres and a temperature of 127°C

17. A fixed mass of gas occupies 200 cm^3 at a temperature of 23°c and a pressure of 740 mm Hg. Calculate the volume of the gas at -25°c and 790 mm Hg pressure.

18. (a) State the Graham's law
(b) 100cm^3 of Carbon (IV) oxide gas diffused through a porous partition in 30seconds. How long would it take 150cm^3 of Nitrogen (IV) oxide to diffuse through the same partition under the same conditions? (C = 12.0, N = 14.0, O = 16.0)