

Multiple Choice Questions (no calculators allowed & only periodic table allowed)

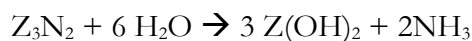
- How many neutrons are present in 0.12g of ^{12}C ? (where L is the Avogadro constant)
 - 0.05 L
 - 0.06 L
 - 0.02 L
 - 0.12 L
- Which of these samples of gas contains the same number of atoms as 2 g of hydrogen?
 - 44 g of carbon dioxide
 - 16 g of methane
 - 40 g of neon
 - 32 g of oxygen
- How many atoms of carbon are present in 30.83 g of Bute? [Bute : $\text{C}_{19}\text{H}_{20}\text{N}_2\text{O}_2$ and $M_r : 308.3$]
 - 1.14×10^{24}
 - 1.14×10^{23}
 - 2.28×10^{24}
 - 2.28×10^{24}
- Which statements are valid for both real and ideal gas molecules?
 - The molecules under elastic collisions.
 - Molecules have insignificant sizes.
 - Molecules have significant attractive forces.
 - Molecules are in constant and random motion.
- Which of the following gases exerts the highest pressure?
 - 1 mol of H_2 with a volume of 1dm^3 at 27°C
 - 2 mol of N_2 with a volume of 0.5dm^3 at 57°C
 - 1 mol of CO with a volume of 1dm^3 at 27°C
 - 2 mol of CO_2 with a volume of 1dm^3 at 27°C

Structured Questions

6. When 10 cm^3 of gaseous alcohol is completely burned in 50 cm^3 of oxygen, the final gaseous mixture consists of 20 cm^3 of carbon dioxide and 20 cm^3 of unreacted oxygen. Determine the structural formula of the alcohol.

[3]

7. During an internal assessment experiment an IB chemistry student discovered that when a Group II element, A burns in nitrogen it forms a metallic nitride with the formula Z_3N_2 . This metallic nitride (0.20g) was reacted with water as shown the following equation:



The liberated ammonia was pass through 35.00 cm^3 of $0.200 \text{ mol dm}^{-3}$ dilute HCl. The unreacted HCl required 21.45 cm^3 of $0.200 \text{ mol dm}^{-3}$ of dilute NaOH for complete reaction.

Determine the identity of Z.

[5]

- 8a. Chlorine dioxide is a thermally reactive gas whereby it decomposes into chlorine gas and oxygen gas instantly. Write a balanced equation for this thermal decomposition reaction. [1]

- 8b. Calculate the volume of chlorine gas (in dm^3) formed when 200.0 g of chlorine is thermally decomposed at a pressure of 1 atm and decomposition temperature of 33°C [3]

- 8c. By comparison, determine which gas (chlorine or chlorine dioxide) behaves more like an ideal gas? [Topic 4: Chemical bonding is a prerequisite for this question] [3]