Chapter 12
End-of-Chapter Questions

1.   Identify by name each of the following gases:
      (a) the red-brown gas;
      (b) the gas with an odour of 'rotten eggs;'
      (c) the hydride which dissolves in water to give a very acidic solution.

2.   Identify by name each of the following gases:
      (a) the only common gas containing three different elements;
      (b) the only sweet-smelling gas;
      (c) the only common basic gas.

3.   A yellow solid element, X, burns in a diatomic gaseous element, Y, to give an acidic gas, Z. Identify by name, X, Y, and Z.

4.   A colourless, odourless, poisonous gas, X, burns in a diatomic gaseous element, Y, to give a colourless, odourless gas, Z, that is slightly acidic. Identify by name, X, Y, and Z.

5.   What volume will 1.00 mol of any gas occupy on the surface of the planet, Venus, where the temperature is about 470ºC and the pressure about 9.3 MPa?

6.   What volume will 1.00 mol of any gas occupy on the surface of the planet, Mars, where the temperature is about −10ºC and the pressure about 0.60 kPa?

7.   What mass of oxygen gas is necessary to fill a 25.0 L container at SATP?

8.   What volume will 30.0 g of carbon dioxide gas occupy at SATP?

9.   A cylinder of acetylene gas, C_2H_2, used in welding has a volume 87.0 L and when full, the gas is at a pressure of 1.72 MPa at a temperature of 28ºC. What mass of the gas in kilograms does the cylinder contain?

10.   The famous Goodyear blimp holds 5.74×10^6 L of helium gas at a pressure of 102 kPa and a temperature of 17ºC. What is the total mass of helium in the airship in tonnes?

11.   A 5.20 g sample of a gas X_2H_6, where X is an unidentified element, occupies a volume of 1.26 L at a pressure of 196 kPa and a temperature of 83ºC. Determine the molar mass of the gas and hence identify element X.

12. A 2.68 g sample of a gas XH_3, where X is an unidentified element, occupies a volume of 775 mL at a pressure of 115 kPa and a temperature of 39℃. Determine the molar mass of the gas and hence identify element X.

13. Calculate the density of the least dense gas, hydrogen, at SATP.

14. Calculate the density of the densest gas, uranium(VI) fluoride, UF_6, at SATP.

15. Given the following information, determine the molecular formula of the compound.
    (a) The compound contains 92.3% carbon and 7.7% hydrogen.
    (b) When 0.573 g of the compound is vapourized in a 226 mL container, it exerts a pressure of 101 kPa at a temperature of 100℃.

16. Given the following information, determine the molecular formula of the compound.
    (a) The compound contains 64.56% carbon, 10.86% hydrogen, and 24.58% oxygen.
    (b) When 10.29 g of the compound is vapourized in a 1.880 L container, it exerts a pressure of 156.5 kPa at a temperature of 448.1 K (R = 8.314 $kPa·L·mol^{-1}·K^{-1}$).