

Exercise 1.413 – Dalton's law of partial pressures

Q1413-01 A mixture of methane and ethane gases is confined in a container at 1000 kPa pressure. If the number of moles of each gas is 20 and 30 respectively, calculate the partial pressures of the two gases.

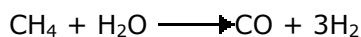
Q1413-02 A sample of producer gas contains 6 moles of nitrogen, 2 moles of carbon monoxide and 2 moles of hydrogen. Calculate the partial pressures of the two gases if the total pressure is equal to 400 kPa.

Q1413-03 The gases emerging from the catalytic chamber in the Haber process at 250 atmospheres pressure (1 atmosphere = 101.3 kPa) have a mole ratio of 3 moles hydrogen to 1 mole nitrogen to 1 mole ammonia. Calculate the partial pressure of each gas.

Q1413-04 A sample of water gas contains 2 moles of carbon monoxide, 20 moles of hydrogen and 3 moles of carbon dioxide. Calculate the partial pressure of each gas, if the total pressure is 500kPa.

Q1413-05 In an experiment to prepare hydrogen chloride gas, 100 cm³ of chlorine gas was mixed with 400 cm³ of hydrogen at STP. Calculate the partial pressure of each gas.

Q1413-06 Synthesis gas, used in the manufacture of methanol, is made by passing methane and steam at a pressure of about 10 atmospheres (1 atmosphere = 101.3 kPa) and a temperature of 850°C over a nickel catalyst.



If the original mixture contains 8 moles of methane and 12 moles of steam, calculate the partial pressures of the two gases.

Q1413-07 The synthesis gas formed from the reaction above, contains carbon monoxide and hydrogen in a molar ratio of 1 to 3. If the total pressure is 12 atmospheres calculate the partial pressure of each gas

Q1413-08 A mixture of 2 moles neon, 1 mole argon and 7 moles helium are contained in a flask at a pressure of 200 kPa. Calculate the partial pressure of each gas.

Q1413-09 Calculate the total pressure exerted by a mixture of 2 moles oxygen, 4 moles of nitrogen and 6 moles of hydrogen in a 100dm³ container at 27°C.

Q1413-10 Dry air is 78.084% nitrogen, 20.946% oxygen and 0.934% argon (all percentages by mass). Determine the mole fractions and partial pressures of the components of dry air at STP.
