A container of 1 L capacity is divided into two equal compartments by a thin partition, which is filled with 6g H2 and 16g CH4 respectively. The pressure in each compartment is recorded as P atm. The total pressure when partition is removed will be

A. P

B. 2P

C. P/2

D. P/4

Solution.

The amount of hydrogen substance will be: $n(H_2)=\frac{m(H_2)}{M(H_2)}=\frac{6g}{2g/mol}=3moles.$

The amount of methane will be: $n(CH_4)=\frac{m(CH_4)}{M(CH_4)}=\frac{16g}{16g/mol}=1mol.$

The total number of moles of gas will be: 3 + 1 = 4 moles.

The partial pressure of hydrogen will be: $\frac{3}{4}\mathrm{P}.$

The partial pressure of methane will be: $\frac{1}{4}\mathrm{P}.$

Total pressure according to Dalton's law: $P=\frac{1}{4}P+\frac{3}{4}P=\mathrm{P}.$

Answer: A.