Task:

How much space would 2.56 moles of xenon gas occupy at STP?

Solution:

STP (standard temperature and pressure):
T = 273K
P = 1 atm

The Ideal Gas Law shows how the volume of gas depends on pressure, temperature and amount of gas.

P·V = n·R·T

P – pressure of gas
V – volume (L)
n – amount of gas (mol)
T – temperature (K)
R – universal gas constant (0.082 L·atm·mol^{-1}·K^{-1})

V= n·R·T / P

The volume of 2.56 mol of gas at STP is

V = 2.56 · 0.082 · 273 / 1 = 57.3 L

Or the second way we can find the volume of the gas at STP is using Avogadro Law.

Avogadro law: 1 mol of gas at STP occupies 22.4 L (it doesn't depend on the kind of gas).

We have 2.56 mol of gas that's why The volume is V = 2.56 · 22.4 = 57.3 L

Answer: V = 57.3 L