Answer on the question #43059, Chemistry, Physical Chemistry

Question:

A gas sample occupies a volume at 33.3 L at 273 degree Celsius and 30 atm. What volume would this gas occupy at STP?

a) 0.5 L
b) 2 L
c) 498 L
d) 48.5 L

Solution:

According to the ideal gas law:

$$\frac{\mathrm{pV}}{\mathrm{T}} = \mathrm{nR}$$

As the nR product is constant:

$$\frac{\mathrm{pV}}{\mathrm{T}} = \mathrm{const}$$

The STP is: p = 1 atm and T = 273 K.

$$\frac{30 * 33.3}{273 + 273} = \frac{1 * \mathrm{V}}{273}$$

$$\mathrm{V} = 499.5\ \mathrm{L}$$

Answer: c)