

NTP - Normal Temperature and Pressure - is defined as air at 20°C (293.15 K, 68°F) and 1 atm (101.325 kN/m², 101.325 kPa)

This task can be solved by using Ideal gas law. The ideal gas law is the equation of state of a hypothetical ideal gas. It is a good approximation to the behaviour of many gases under many conditions, although it has several limitations. The ideal gas law is often introduced in its common form:

$$PV = nRT$$

where P is the pressure of the gas, V is the volume of the gas, n is the amount of substance of gas (also known as number of moles), T is the temperature of the gas and R is the ideal, or universal, gas constant, equal to the product of the Boltzmann constant and the Avogadro constant.

In SI units, P is measured in pascals, V is measured in cubic metres, n is measured in moles, and T in kelvin (273.15 Kelvin = 0.00 degrees Celsius). R has the value $8.314\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$ or $0.08206\text{ L}\cdot\text{atm}\cdot\text{mol}^{-1}\cdot\text{K}^{-1}$ if using pressure in standard atmospheres (atm) instead of pascals, and volume in liters instead of cubic metres.

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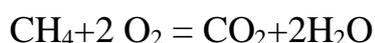
For answering this task you need to find amount of CO₂:

$$PV=nRT$$

$$n = PV/RT$$

$$n = 101.325 * 0.112 / 8.31 * 293.15 = 0,00466 \text{ moles}$$

The equation for reaction is next:



Amount ratio between CH₄, O₂ and CO₂ is 1:2:1

The mass can be found from:

$n = m/M_w$, where n is amount, M_w is molecular mass

$$m = n \cdot M_w$$

For **CH₄** amount is equal to CO₂ amount:

$$m = 0,00466 \cdot 16 = \mathbf{0,0745g}$$

For **O₂** amount is equal to 2* CO₂ amount:

$$m = 2 \cdot 0,00466 \cdot 32 = \mathbf{0,2982g}$$