Answer on Question #56728 - Chemistry - General Chemistry

Question:

How many total atoms are in 0.340 g of P_2O_5?

Solution.

Molecular weight of P_2O_5 is

$$M_W = 2 \times M_{(P)} + 5 \times M_{(O)} = 2 \times 31 + 5 \times 16 = 62 + 80 = 142\ g/mol$$

Mols amount of 0.340 g of P_2O_5 is

$$M = \frac{m}{M_W} = \frac{0.340\ g}{142\ g/mol} = 0.002\ mol$$

Amount of P_2O_5 molecules is

$$N_{molecules} = M \times N_A = 0.002\ mol \times 6.022 \cdot 10^{23}\ mol^{-1} = 1.2 \cdot 10^{21}$$

Amount of atoms in this amount of P_2O_5 is

$$N_{atoms} = N_{molecules} \times 10 = 1.2 \cdot 10^{21} \times 10 = 1.2 \cdot 10^{22}$$

Answer: $1.2 \cdot 10^{22}$ atoms