

Answer on Question #44978 – Chemistry – Inorganic Chemistry

Question

Calculate the number of moles, number of molecules and number of atoms in 38 g of fluorine gas.

Solution

Formula of fluorine molecule is F_2

Molar mass of F_2 : $M = 38.0 \text{ g/mol}$

Given that mass of F_2 : $m = 38 \text{ g}$

Number of moles (n):

$$n = \frac{m}{M} = \frac{38 \text{ g}}{38.0 \text{ g/mol}} = 1 \text{ mol}$$

Number of molecules (N):

$$N = n \cdot N_A = 1 \text{ mol} \cdot 6.023 \cdot 10^{23} \frac{\text{molecules}}{\text{mol}} = 6.023 \cdot 10^{23} \text{ molecules}$$

Since each molecule of fluorine consist of two atoms, the number of atoms in given amount of fluorine gas is two times greater than the number of molecules, i.e. $1.205 \cdot 10^{23}$ atoms.

Answer:

1 mole,

$6.023 \cdot 10^{23}$ molecules

$1.205 \cdot 10^{23}$ atoms