Answer on Question #42554 - Chemistry - Inorganic Chemistry

Question

Total number of valence electrons in 4.2 g of Nitride ion ?

Solution

The nitride ion is a nitrogen ion of charge 3- : N^{3-}

Its Lewis dot structure is: *N*

As is clear from the Lewis structure the number of valence electrons in a single nitride ion is equal to **8**.

Number of nitride ions in 4.2 g is

$$N_{N^{3-}} = \frac{m_{N^{3-}}}{M_{N^{3-}}} N_A = \frac{4.2 g}{14.0 g/mol} 6.02 \cdot 10^{23} mol^{-1} = 1.8 \cdot 10^{23},$$

where $M_{N^{3-}}$ – molar weight of nitride ion, N_A – Avogadro's number.

Thus, the total number of valence electrons in 4.2 g of nitride ion is

$$N_e = 8 \cdot N_{N^{3-}} = 8 \cdot 1.8 \cdot 10^{23} = 1.4 \cdot 10^{24}$$

Answer: 1.4.10²⁴ electrons