Question # 76942 - Chemistry - General Chemistry

A 19.91 g sample of $Mo_2O_3(s)$ is converted completely to another molybdenum oxide by adding oxygen. The new oxide has a mass of 23.90 g. Add subscripts below to correctly identify the empirical formula of the new oxide.

Answer

$n(Mo_2O_3) = m(Mo_2O_3)/M(Mo_2O_3) = 19.91 / 240g = 0.083$ mol Mo_2O_3

$M(Mo_2O_3) = 240$ g/mol

$n(O) = (m(Mo_xO_y) – m(Mo_2O_3))/M(O) = (23.90 - 19.91)/ 16 = 0.249$ mol O

$M(O) = 16$ g/mol

Number oxygen atoms are added:

$N(O) = n(O)/n(Mo_2O_3) = 0.249 / 0.083 = 3$

So for every molecule of Mo_2O_3, 3 oxygen atoms are added, so the new formula is: Mo_2O_6, which makes the empirical formula MoO_3.