Answer on Question #67363 - Chemistry - General Chemistry

Question: which represents greatest mass among 100 gm of calcium, 1 mole of calcium oxide, 1025 molecules of oxygen

Solution

I am not really sure whether the original question mentioned 1025 or 10^{25} molecules of oxygen, so the solution will be done for both variants.

1) Find the mass of 1 mole of calcium oxide:

$$m(1\ mol\ CaO) = M(CaO) = M(Ca) + M(O) = 40 + 16 = 56\ g.$$

2) Find the mass of 1025 and 10^{25} molecules of oxygen:

$$m(1025\ O_2\ molecules) = \frac{M(O_2)}{N_A} * 1025 = \frac{32}{6.02 * 10^{23}} * 1025 \approx 5.45 * 10^{-20}\ g.$$

$$m(10^{25}\ O_2\ molecules) = \frac{M(O_2)}{N_A} * 10^{25} = \frac{32}{6.02 * 10^{23}} * 10^{25} \approx 531.56\ g.$$

Answer: if the question mentioned 1025 molecules of oxygen, then the greatest mass is represented by 100 grams of calcium. If the question mentioned 10^{25} molecules of oxygen, then the greatest mass is represented by 10^{25} molecules of oxygen.