What mass in grams of oxygen gas is needed to react with10.3084 moles of magnesium. The molar mass of oxygen gas is 31.9988 grams per mole and the molar mass of magnesium is 24.30 grams per mole.

Solution:

First of all, we need to write down the equation of the reaction between magnesium and oxygen:

$$2Mg + O_2 = 2MgO;$$
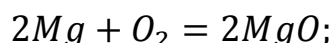
As can be seen from the equation for magnesium coefficient 2, and for oxygen 1, respectively, for the course of the chemical reaction, oxygen is required in 2 times less than magnesium in the quantitative (molar) value $(v(Mg))$. From the condition of this task we know the amount of magnesium. It is equal to 10.3084 moles. The amount of oxygen we need for the reaction:

$$v(O_2) = \frac{v(Mg)}{2} = \frac{10.3084}{2} = 5.1542 \; mol.$$

From the condition we know the molar mass of oxygen $(M(O_2))$. It is equal to 31.9988 grams per mole. In the course of the solution we found the amount (moles) of oxygen necessary for the reaction. Proceeding from this, the oxygen mass necessary for the reaction is:

$$m(O_2) = M(O_2) \times v(O_2) = 31.9988 \times 5.1542 = 164.9282 \; g.$$

Answer: the required mass of oxygen is 164.9282 grams.