

## SIMPLE STOICHIOMETRIC CALCULATIONS

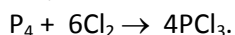
- How many grams of lithium must be reacted with oxygen to obtain 60 g of lithium oxide?
- How many grams of limestone (calcium carbonate) must be decomposed to obtain 448 L of carbon dioxide gas at STP?
- How many liters of oxygen gas can be produced at STP from the decomposition of 2 moles of potassium chlorate?
- How many grams of hydrochloric acid must be used to neutralize 10 g of sodium hydroxide?
- How many grams of potassium must be dissolved in water to obtain 33.6 L of hydrogen gas at STP?
- A 50 g sample of calcium carbonate (limestone) decomposes by heating.
  - How many molecules of calcium oxide can form?
  - How many liters of carbon dioxide gas can form at STP?
- How many grams of aluminum must be reacted with sulfuric acid to obtain 11.2 L of hydrogen gas at STP?
- How many grams of barium hydroxide must be used to neutralize 7.3 g of hydrochloric acid?
- How many liters of hydrogen and oxygen gases can be produced from the electrolysis of 3.6 g of water?
- How many liters of oxygen are needed to burn 32 g of methane (CH<sub>4</sub>) completely?
- A 4.6 g sample of ethyl alcohol is burned.
  - How many water molecules can be formed?
  - How many liters of carbon dioxide can be formed at STP?
- When a 20 g sample of calcium carbonate is reacted with excess hydrochloric acid, how many liters of carbon dioxide will form at STP?
- How many liters of nitrogen and hydrogen must be reacted with each other to obtain 20 L of ammonia?
- How many grams of sodium hydroxide are needed to neutralize 4.9 g of sulfuric acid?
- How many liters of hydrogen gas can evolve at STP from the reaction of 5.4 g of aluminum with excess hydrochloric acid solution?
- How many liters and grams of oxygen gas can be produced from the electrolysis of 9 g of water at STP?
- How many liters of oxygen are liberated by heating of 490 g of potassium chlorate at STP?
- Calculate the volume of air required to burn 4.6 g of ethyl alcohol at STP.
- How many grams of oxygen can react with 6 g of hydrogen gas completely?
- 5 g of hydrogen reacted with nitrogen at STP. What volume of ammonia in liters produces?
- How many liters of gas at STP will evolve by the decomposition of 25 g of calcium carbonate?
- What is the volume of oxygen gas, in liters, needed to burn 36 g of carbon?
- How many liters of hydrogen gas at STP will be obtained after the reaction of 13 g of zinc with hydrochloric acid?
- Hydrogen reacts with chlorine to produce 89.6 L of hydrogen chloride at STP. What is the mass of chlorine used?
- How many liters of oxygen gas at STP can be produced from the electrolysis of 3.6 g of water?
- How many liters of methane (CH<sub>4</sub>) gas at STP are obtained from the reaction of 72 g of Al<sub>4</sub>C<sub>3</sub> with excess water?
$$\text{Al}_4\text{C}_3 + 12\text{H}_2\text{O} \rightarrow 3\text{CH}_4 + 4\text{Al}(\text{OH})_3$$
- How many liters of hydrogen gas at STP will produce when a piece of aluminum reacts with 73 g of 20 % hydrochloric acid completely?
- A 50 g sample of limestone (calcium carbonate), which is 80 % pure, decompose by heating. How many liters of carbon dioxide at STP can form?
- How many grams of water are evaporated by heating 50 g of copper II sulfate penta hydrate?
- $\text{P}_4 + 5\text{O}_2 \rightarrow 2\text{P}_2\text{O}_5$   
 $\text{P}_2\text{O}_5 + 3\text{H}_2\text{O} \rightarrow 2\text{H}_3\text{PO}_4$

How many grams of  $P_4$  must be used in order to obtain 0.4 mol of  $H_3PO_4$  according to the above reaction?

31. What is the volume of 2.8 g of nitrogen gas in liters at  $273^\circ C$  and 4 atm?

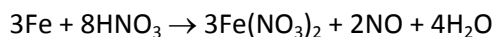
32. 24.5 g of potassium chlorate is heated and oxygen gas is obtained at  $273^\circ C$  and 2 atm. What is the volume of oxygen gas in liters?

33. We need to produce 10 moles of  $PCl_3$  by the reaction;



How many moles of  $P_4$  and  $Cl_2$  are required respectively?

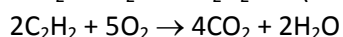
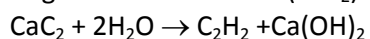
34. How many grams of water are produced when 84 g of iron are consumed according to the following reaction?



35. What are the masses of salt and water in 61.6 g of  $Fe_2(SO_4)_3 \cdot 12H_2O$  respectively?

36. A 5.72 g of  $Na_2CO_3 \cdot xH_2O$  solid is heated and its mass decreases by 3.6 g. What is the value of  $x$  in the formula?

37. How many liters of oxygen at STP are required to burn acetylene ( $C_2H_2$ ) gas obtained by the reaction of 12.8 g of calcium carbide ( $CaC_2$ ) with water?



38. A 1.5 g of hydrogen reacted with nitrogen at STP. What volume of ammonia in liters produces?

39. According to the following equation:



A. How many grams of  $Fe_2O_3$  are produced by the reaction of one mole of  $FeS_2$ ?

B. How many liters of  $SO_2$  will be produced by the reaction of one mole of  $FeS_2$  at STP?

40.  $NaOH$  is formed by the reaction of  $Ca(OH)_2$  with  $Na_2CO_3$ . In order to produce 1 kg of  $NaOH$ . (Reaction:  $Ca(OH)_2 + Na_2CO_3 \rightarrow NaOH + CaCO_3$ )

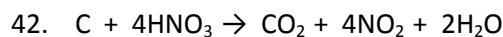
A. How many grams of  $Ca(OH)_2$  and of  $Na_2CO_3$  must react with each other?

B. What is the mass in grams of  $CaCO_3$  produced after reaction?

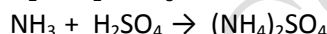
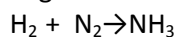
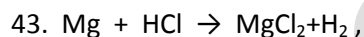
41. When sulfur is burnt with oxygen, two types of oxides are formed. The percentage by mass oxygen is 50% in the first one and 60% in the second one.

A. How many grams of oxygen combine with 1.6 grams of S, calculate for both oxides?

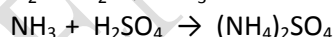
B. How many grams of sulfur combine with 1.6 grams of O, calculate for both oxides?



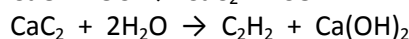
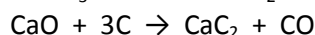
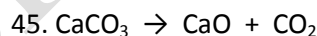
How many grams of carbon must be reacted in order to produce 4.48L of  $NO_2$  at STP by the given reaction? (C: 12)



By the given series of reactions, how many grams of  $(NH_4)_2SO_4$  can be produced by starting 7.2 grams of Mg with a maximum efficiency?



How many moles of Zn undergoes the reaction in order to produce 0.1 mol of  $(NH_4)_2SO_4$  by the above consecutive reactions?



How many liters of  $C_2H_2$  are produced from 15 grams of  $CaCO_3$  with 100% efficiency according to above equations?

45.  $NO$  and  $H_2O$  are produced when  $NH_3$  is burnt. When 3.4 grams of  $NH_3$  is burnt, how many liters of  $NO$  is produced at STP?

46. According to the following equation



2.4 grams C is reacted with concentrated  $HNO_3$  acid. How many liters of  $NO_2$  are produced at STP?

47. How many grams of Pb are reacted with 8 grams of oxygen in order to produce  $Pb_3O_4$ ?

48.  $KCl$  and  $O_2$  are produced due to the decomposition of 1 mole of  $KClO_3$ , by using heat.

How many liters of  $O_2$  are produced at STP?

49. According to the following equation.



To produce 11.2 liters of  $Cl_2$  gas at STP, how many grams of  $MnO_2$  must be used?

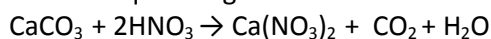
50. 19.5 grams of Zn is reacted with excess HCl to give H<sub>2</sub> gas and the produced H<sub>2</sub> gas reacts with enough N<sub>2</sub>. What is the mass of NH<sub>3</sub> formed?

51. What is the mass of oxygen gas in grams needed to burn 36 g of carbon?

52. What volume of hydrogen gas in liters is produced at STP, if 260 g of zinc completely reacts with sulfuric acid?

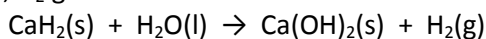
53. How many grams of water can be obtained by heating 49.9 g of copper II sulfate pentahydrate?

54. For the equation given.



How many grams of HNO<sub>3</sub> react with 16 grams of CaCO<sub>3</sub>?

55. By the reaction of calcium hydride (CaH<sub>2</sub>) with H<sub>2</sub>O, H<sub>2</sub> gas is evolved.

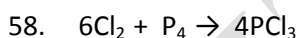


If 21 grams of CaH<sub>2</sub> is entered the reaction,

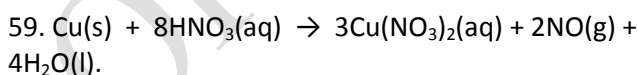
- How many grams of H<sub>2</sub>O are required?
- How many grams of Ca(OH)<sub>2</sub> is formed?
- How many liters of H<sub>2</sub> gas is produced at STP?

56. A cubic aluminum piece with a 3 cm edge is immersed into excess amount of HCl solution. How many liters of H<sub>2</sub> gas is produced at STP. (density of Al is 2.7 g/cm<sup>3</sup>, Al:27)

57. 12.6 grams of HNO<sub>3</sub> is poured onto the place of Al metal whose thickness and density are 0.1 cm and 2.7g/cm<sup>3</sup>, respectively. Assume that all the solution is reacted completely and it dissolves Al plate and makes a hole on it. What is the area of hole in cm<sup>2</sup>?



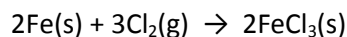
In the reaction given above, how many grams of Cl<sub>2</sub> and P<sub>4</sub> are required in order to produce 0.4 moles of PCl<sub>3</sub>?



By considering the above chemical equation:

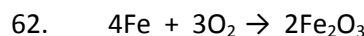
- How many moles of NO will be produced by the reaction of 8 moles of Cu with enough amount of HNO<sub>3</sub>?
- How many moles of HNO<sub>3</sub> is required in order to consume 7 moles of Cu.
- How many moles of Cu must enter the reaction in order to produce 3 moles of NO.

60. The metal iron reacts with the gas Cl<sub>2</sub> according to the reaction;



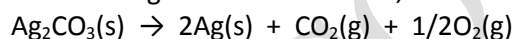
How many grams of FeCl<sub>3</sub> are produced by the reaction of 14.2 grams of Cl<sub>2</sub> with a sufficient amount of Fe metal? (Fe: 56, Cl: 35.5)

61. Suppose that S atoms in Cu<sub>2</sub>S are converted to H<sub>2</sub>SO<sub>4</sub>, completely by a series of reaction. What is the mass in grams of H<sub>2</sub>SO<sub>4</sub> produced from 159 grams of Cu<sub>2</sub>S?



How many grams of Fe<sub>2</sub>O<sub>3</sub> are produced by the oxidation of 112 grams of Fe?

63. For the given reaction below,



A. How many grams of Ag<sub>2</sub>CO<sub>3</sub> must be decomposed in order to produce 2.16 grams of Ag?

B. What is the volume in liters of O<sub>2</sub> produced in this process at STP?