

NAME _____ DATE _____

Stoichiometry

Practice Problems (Level 1)

1. In the reaction shown here, what weight of iron is needed to react completely with 32.0 g of sulfur? $\text{Fe} + \text{S} \rightarrow \text{FeS}$
2. When zinc reacts with sulfuric acid, as shown here, what weight of hydrogen is produced from 31.8 g of zinc? $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2 \uparrow$
3. How much sulfurous acid can be produced when 128 g of sulfur dioxide combines with water? $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$
4. Silver bromide can be precipitated by the reaction of silver nitrate with sodium bromide. What weight of precipitate can be produced starting with 34.3 of sodium bromide? $\text{NaBr} + \text{AgNO}_3 \rightarrow \text{NaNO}_3 + \text{AgBr} \downarrow$
5. Hydrochloric acid is added to 50.0 g of iron (II) sulfide. What weight of hydrogen sulfide is produced? $\text{FeS} + 2 \text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2\text{S} \uparrow$
6. How much nitric acid is needed to react completely with 25.0 g of magnesium in the following reaction? $\text{Mg} + 2 \text{HNO}_3 \rightarrow \text{Mg}(\text{NO}_3)_2 + \text{H}_2 \uparrow$
7. How much copper (I) chloride can be produced beginning with 75.0 g of copper (I) oxide? $\text{Cu}_2\text{O} + 2 \text{HCl} \rightarrow 2 \text{CuCl} + \text{H}_2\text{O}$
8. What volume of oxygen gas is produced by the decomposition of 100.0 g of sodium nitrate? $2 \text{NaNO}_3 \rightarrow 2 \text{NaNO}_2 + \text{O}_2 \uparrow$
9. What volume of oxygen is produced when 75.0 g of water is decomposed by electrolysis? $2 \text{H}_2\text{O} \rightarrow 2 \text{H}_2 + \text{O}_2 \uparrow$
10. What volume of carbon dioxide is required to produce 50.0 L of carbon monoxide according to the following reaction? $\text{CO}_2 + \text{C} \rightarrow 2 \text{CO} \uparrow$

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Practice Problems (Level 2)

1. When aluminum is heated in oxygen, aluminum oxide is formed. What weight of the oxide can be obtained from 25.0 g of the metal?
2. When steam (hot water) is passed over iron, hydrogen gas and iron (III) oxide are formed. What weight of steam would be needed to react completely with 100.0 g of iron?
3. How much ammonium hydroxide is needed to react completely with 75.0 g of copper (II) nitrate in a double replacement reaction?
4. When ammonia is burned in oxygen, free nitrogen gas and water are produced. What volume of ammonia will react completely with 25.0 L of oxygen? What volume of nitrogen gas is formed?
5. When sodium carbonate reacts with hydrochloric acid, the carbonic acid that is formed immediately breaks down into carbon dioxide and water. What weight of sodium carbonate would have been present originally if 5.0 L of carbon dioxide were obtained in this way?
6. How much copper metal can be obtained by the single replacement reaction between copper (I) nitrate and 30.0 g of iron metal? (Iron (II) nitrate is formed.)
7. What weight of sulfuric acid will be needed to react completely with 35.5 g of ammonia in the production of ammonium sulfate?
8. What weight of chlorine gas will be needed to react completely with 85.8 g of potassium iodide in a single replacement reaction?
9. In the neutralization reaction between sulfuric acid and potassium hydroxide, how much potassium sulfate can be produced if you have 150.0 g of sulfuric acid to begin with?
10. What volume of nitrogen gas is needed to react completely with 150.0 L of hydrogen in the production of ammonia?

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Practice Problems (Level 3)

1. How much aluminum metal is needed to replace all of the iron from 27.8 g of iron (III) oxide?
2. What volume of chlorine gas will react with antimony in order to produce 58.9 g of antimony trichloride?
3. What weight of iron metal will be required to produce 20.8 g of iron (III) oxide in the reaction with pure oxygen?
4. What weight of aluminum bromide can be produced by the reaction of sufficient aluminum sulfate with 8.75 g of ammonium bromide?
5. What weights of water and diphosphorus pentoxide will be needed in order to produce 95.5 g of phosphoric acid?
6. 50.0 g of oxygen are available for the combustion of 25.0 g of carbon. Is this an adequate amount of oxygen? If so, by how much in excess is the oxygen? If not, by how much is the carbon in excess?
7. How many grams of carbon dioxide can be obtained from the reaction of 100.0 g of sulfuric acid and 100.0 g of calcium carbonate?
8. In testing for the efficacy of an antacid compound, 5.0 g of hydrochloric acid is mixed with 24.0 g of magnesium hydroxide. Is this enough base to react with all the acid?
9. In the human body, the toxic compound hydrogen cyanide is neutralized by the acid, $\text{H}_2\text{S}_2\text{O}_3$, according to the reaction: $\text{HCN} + \text{H}_2\text{S}_2\text{O}_3 \rightarrow \text{HCNS} + \text{H}_2\text{SO}_3$. If 1.000 mg of $\text{H}_2\text{S}_2\text{O}_3$ is available in the body, will this be enough to neutralize 2.000 mg of HCN swallowed by a person?
10. In the combustion of hydrogen sulfide with oxygen, will 45.0 L be enough oxygen to burn completely 35.0 g of hydrogen sulfide?