

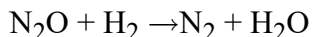
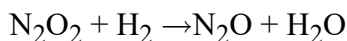
Name:

Chapter 16 Review Quiz

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ☐ 1. Chemical synthesis refers to:
- chemistry being used to produce a reaction.
 - chemistry being used to break a substance down.
 - chemistry being applied to produce a new product.
 - new branches of chemistry being discovered.
- ☐ 2. What factor would *not* be considered important when designing a chemical synthesis reaction?
- availability of the reactants
 - cost
 - amount of wastage
 - name of the product
- ☐ 3. The name given to the process where the products are considered and then chemists work backwards to determine the reactants is:
- retrosynthetic analysis.
 - backwards analysis.
 - retrospective analysis.
 - reverse analysis.
- ☐ 4. In the following reaction:
- $$\text{NO}^2 + \text{NO}_2 \rightarrow \text{NO} + \text{NO}_3$$
- $$\text{NO}_3 + \text{CO} \rightarrow \text{NO}_2 + \text{CO}_2$$
- the NO_3 would be considered:
- a reactant.
 - an intermediate.
 - a product.
 - a waste.
- ☐ 5. The contact process is used to produce:
- ammonia.
 - sulfur dioxide.
 - sodium hydroxide.
 - sulfuric acid.
- ☐ 6. What is the reaction below an example of?
- $$\text{NO} + \text{NO} \rightarrow \text{N}_2\text{O}_2$$
- $$\text{N}_2\text{O}_2 + \text{H}_2 \rightarrow \text{N}_2\text{O} + \text{H}_2\text{O}$$
- $$\text{N}_2\text{O} + \text{H}_2 \rightarrow \text{N}_2 + \text{H}_2\text{O}$$
- linear pathway
 - divergent pathway
 - convergent pathway
 - parabolic pathway
- ☐ 7. The intermediate(s) of the reaction below is/are:
- $$\text{NO} + \text{NO} \rightarrow \text{N}_2\text{O}_2$$



- a. N_2O_2 only.
- b. N_2O_2 and N_2O .
- c. H_2 and N_2O .
- d. N_2O_2 , H_2 and H_2O .

▼ 8. Which of the following processes is a convergent sequence?

- a. contact process
- b. oxidation of a primary alcohol forming a carboxylic acid
- c. esterification
- d. hydrogenation of ethene

▼ 9. Which of the following would not affect the yield of a reaction?

- a. the temperature of the reaction mixture
- b. the pressure of a gaseous system
- c. removing the products from the reaction mixture
- d. the addition of a catalyst

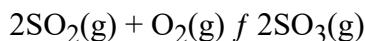
▼ 10. Consider the following reaction in the direct synthesis of hydrogen chloride.



Which of the following would increase the yield of hydrogen chloride?

- a. Increasing the volume of the reaction vessel
- b. Decreasing the temperature of the reaction mixture
- c. Limiting the amount of chlorine gas available
- d. Adding neon gas to the reaction mixture

▼ 11. The second step of the contact process is shown below.



In this reaction, a high pressure would:

- a. increase the reaction rate.
- b. increase the yield of sulfur trioxide.
- c. increase both the rate and the yield.
- d. increase neither the rate nor the yield.

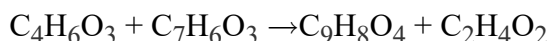
▼ 12. The Haber process is used to produce:

- a. nitrogen gas.
- b. hydrogen gas.
- c. ammonia gas.
- d. ammonium ions.

▼ 13. Which condition is chosen as a compromise between the rate and yield in the Haber process?

- a. concentration of nitrogen gas
- b. pressure of the system
- c. presence of an iron/iron oxide catalyst
- d. temperature

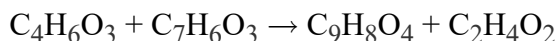
▼ 14. Aspirin ($\text{C}_9\text{H}_8\text{O}_4$) can be produced from the reaction between acetic anhydride ($\text{C}_4\text{H}_6\text{O}_3$) with salicylic acid ($\text{C}_7\text{H}_6\text{O}_3$).



What is the limiting reactant when 21 g of acetic anhydride reacts with 25 g of salicylic acid?

- a. Acetic anhydride
- b. Salicylic acid
- c. Neither, because they are in the correct stoichiometric ratio.
- d. Neither, because the reaction will not occur.

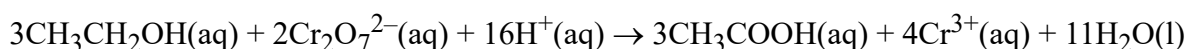
- ▼ 15. Aspirin ($\text{C}_9\text{H}_8\text{O}_4$) can be produced from the reaction between acetic anhydride ($\text{C}_4\text{H}_6\text{O}_3$) with salicylic acid ($\text{C}_7\text{H}_6\text{O}_3$).



What mass of aspirin is produced when 21 g of acetic anhydride reacts with 25 g of salicylic acid?

- a. 4.5 g
b. 32.6 g
c. 37.1 g
d. 69.7 g
- ▼ 16. What information is not required to calculate the percentage yield of a reaction?
- a. moles of the reactants used
b. mass of the desired product produced
c. the use of the product
d. a balanced chemical equation
- ▼ 17. It was calculated that 10.0 g of carbon dioxide could be produced from the reaction between hydrochloric acid and calcium carbonate. When the reaction occurred only 8.80 g was produced. What is the percentage yield for the reaction?
- a. 100 %
b. 88.0 %
c. 10.0 %
d. 8.80 %

- ▼ 18. Ethanoic acid is produced by the oxidation of ethanol according to the reaction:



If 1.5 g of ethanoic acid is synthesised from 1.5 g of ethanol, what is the percentage yield?

- a. 23%
b. 30%
c. 77%
d. 100%
- ▼ 19. Which of the following techniques would be an effective way of checking the purity of a sample?
- a. IR spectroscopy
b. Gravimetric analysis
c. Volumetric analysis
d. All of the above
- ▼ 20. The purity of a sample of glacial acetic acid (CH_3COOH) was being checked by the quality control manager before being distributed. A 10 mL sample of glacial acetic acid was diluted to 100 mL. 10 mL of the diluted sample was analysed by titration and required 50 mL of 0.3 mol L^{-1} NaOH to reach end point. If pure glacial acetic acid has a molarity of 17.4 mol L^{-1} what is the purity of sample being analysed?
- a. 8.6 %
b. 43 %
c. 86 %
d. 100 %

