Ch.11-Q2W6- Test.- Chemical quantities

True/False

Indicate whether the statement is true or false.

- _____ 1. The molecular formula for a compound is the formula with the smallest whole-number mole ratio of the elements.
- _____ 2. The percent yield is the maximum amount of product that can be produced from a given amount of reactant.

Multiple Choice

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

| 3. | 3. Copper reacts with 36.7 g of silver nitrate to produce copper(II) nitrate and silver. Determine the theorem | | | | |
|--------|--|-------|--|--|--|
| | yield of $Cu(NO_3)_2$ if the actual yield is 31.29 g | | | | |
| | a. 12.9 g | c. | 77.3 g | | |
| | b. 40.5 g | d. | 0.773 g | | |
| 4. | Calculate the mass of citric acid when 2.60 mol of sucrose gas reacts with oxygen. | | | | |
| | a. 1.30 g | c. | 0.769 g | | |
| | b. 499 g | d. | 999 g | | |
| 5. | 5. How many grams of water are produced when 2.50 mol oxygen reacts with hydrogen? | | | | |
| | a. 45.0 g | c. | 22.5 g | | |
| | b. 0.277 g | d. | 90.0 g | | |
| 6. | How many moles of carbon dioxide is produce | d wl | hen 10.4 mol of propane gas is burned in excess oxygen? | | |
| | a. 31.2 mol | c. | 0.288 mol | | |
| | b. 3.46 mol | d. | 52.0 mol | | |
| 7. | What is the mass of potassium chloride when 2 | .50 | g of potassium reacts with excess of chlorine gas? | | |
| | a. 4.77 g | c. | 728 g | | |
| | b. 8.57 g | d. | 9.52 g | | |
| 8. | Hydrofluoric acid reacts with 31.3 g of silica to | o pro | oduce hexafluorosilicic acid. Determine the percent yield of | | |
| | H_2SiF_6 if the actual yield is 60.3 g. | • | | | |
| | a. 31.8% | c. | 12.2% | | |
| | b. 0.818% | d. | 81.8% | | |
| | | | | | |

Completion

- A. formula mass
- B. mole
- C. empirical formula
- D. stoichiometry
- E. Avogadro constant
- 9. The ______ of a compound expresses the smallest whole number ratio of the atoms in the compound.
- 10. A unit of measure used to count the number of atoms, molecules, or formula units of a substance is the
- 11. The number of items contained in one mole of any substance is called the _____
- 12. There are 6.02×10^{23} paper clips in a _____ of paper clips.
- 13. The mass in atomic mass units of one formula unit of a compound is the______ of the compound.
- 14. The amount of product of a chemical reaction can be predicted by _____
- 15. The compounds CH_2O and $C_6H_{12}O_6$ have the same _____.

Matching

Match each item with the correct item below.

- a. formula mass
- b. ideal gas law
- c. study that relates mass to number of particles
- d. percent yield
- e. one molecule or one mole
- f. 6.02×10^{23}
- g. 0.10 mole
- h. molar mass
- i. molar volume
- j. 0.25 mole
- k. 8.31 kPa \cdot L/mol \cdot K
- 1. atomic mass unit
- m. empirical formula
- ____ 16. u
- _____ 17. stoichiometry
- _____ 18. 24.5 g of H₂SO₄
- _____ 19. *R*
- _____ 20. Avogadro constant
- _____ 21. 58.5 u of NaCl
- $_$ 22. PV = nRT
- _____ 23. 2 g of H₂
- ____ 24. 22.4 L
- _____ 25.CO₂
- _____ 26. NaCl

Short Answer

A chemical plant is being designed to manufacture ethanol (ethyl alcohol; C_2H_5OH) by treating ethylene (ethene; C_2H_4) gas with water, using phosphoric acid as a catalyst. Answer the following questions about this process.

- 27. If the unused ethene is passed through the reaction chamber again, 12.8 moles of ethanol are produced, compared to a theoretical yield of 13.2 moles. What is the percent yield?
 - A. 96.0 percent B. 97.0 percent C. 98.0 percent D. 99.0 percent
- 28. In the first pass of ethene through the reaction chamber, the actual rate of production of ethanol is 271 g/min. What is the percent yield for the reaction?

A. 4.00 percent B. 5.00 percent C. 6.00 percent D. 7.00 percent

29. Suppose that ethylene is to be supplied to the reaction chamber at the rate of 100.0 L per minute at 300.0°C and 7.00×10^3 kPa. At what rate in moles per minute is ethylene being supplied to the reaction chamber?

A. 117 mol/min B. 127 mol/min C. 137 mol/min D. 147 mol/min

30. Calcium oxide can be prepared by heating calcium metal in oxygen according to the reaction: $2Ca + O_2 \rightarrow 2CaO$. How much calcium would be needed to make 15.0 g of calcium oxide?

A. 8.7 g B. 9.7 g C. 10.7 g D. 11.7 g

31. Determine the percent fluorine in the following fluoride of chromium. chromium(II) fluoride, CrF₂

A. 40.2% B. 41.2% C. 42.2% D. 43.2%

32. How many atoms are there in 106.2 g of potassium?

| A. 14.4×10^{23} atoms | B. 16.4×10^{23} atoms |
|--------------------------------|--------------------------------|
| C. 18.4×10^{23} atoms | D. 20.4×10^{23} atoms |

Problem

Nitrogen and oxygen combine with each other to form a series of compounds. This chart summarizes laboratory research done on this series of compounds. From the data supplied, calculate the empirical and molecular formulas for each oxide listed.

| Compound | Percentage Nitrogen | Percentage Oxygen | Molecular Mass |
|----------|------------------------|----------------------|----------------|
| А | 63.6 | 36.4 | 44.01 u |
| В | 30.4 | 69.6 | 46.00 u |
| С | 36.9 | 63.1 | 76.01 u |
| D | 25.9 | 74.1 | 108.01 u |
| Е | 46.7 | 53.3 | 30.01 u |

A. N_2O_3

B. N_2O_5

 $C. N_2O$

D. NO

- 33. Compound A is _____
- 34. Compound D is _____
- 35. Compound C is _____
