

Stoichiometry Practice Exam

Chemistry

Name

MULTIPLE CHOICE.

Choose the one alternative that best completes the statement or answers the question.

1) What is the correct value for Avogadro's number?

- A) $6.022 \times 10^{2.3}$ B) 6.022×10^{33} C) 6.022×10^{23} D) 6.023×10^{22}

2) One mole of boron has a mass of _____ g.

- A) 5 B) 9.012 C) 10.811 D) 6.022×10^{23}

3) What is the mass of 0.560 moles of chlorine gas?

- A) 39.7 B) 63.3 C) 127 D) 19.9

4) How many moles are there in 82.5 grams of iron?

- A) 1.48 B) 4.97×10^{25} C) 55.85 D) 0.677

E) none of the above

5) The molar mass of $\text{Ca}_3(\text{PO}_4)_2$ is _____.

- A) 246 B) 310 C) 215 D) 279

6) The mass percent of chlorine in $\text{Mg}(\text{ClO}_3)_2$ is:

- A) 43.6% B) 37.1% C) 33.0% D) 12.7%

7) What is the molar mass of aspirin, $\text{C}_9\text{H}_8\text{O}_4$?

- A) 29.02 g/mol B) 252.25 g/mol
C) 116.08 g/mol D) 180.17 g/mol E) 244.17 g/mol

8) What is the empirical formula of a compound that contains 78.11% B and 21.89% H?

- A) B_2H_3
B) B_2H_6
C) BH_3
D) BH_2

9) Vitamin C is known chemically by the name ascorbic acid. Determine the empirical formula of ascorbic acid if it is composed of 40.92% carbon, 4.58% hydrogen, and 54.50% oxygen.

- A) $\text{C}_2\text{H}_3\text{O}_2$
B) $\text{C}_3\text{H}_4\text{O}_3$
C) CH_2O
D) CHO

10) The empirical formula of a hydrocarbon is C_3H_5 and the molecular mass is 205.4g/mol? By what factor must you multiply the empirical formula to reach the molecular formula?

- A) 1 B) 5 C) 2 D) 7

11) The chemical formula CH_2O can be classified as:

- A) molecular only. B) empirical, possibly molecular. C) empirical only. D) not enough information

12) Which of the following is already in its empirical formula?

- A) $C_6H_{12}O_3$ B) $C_{22}H_{34}O_{10}$ C) $C_5H_{12}O_2$ D) C_6H_6 E) none of the above

13) Octane is a principle component of gasoline. The empirical formula of octane is C_4H_9 , and the molar mass of octane is 114 grams per mole. What is the molecular formula of octane?

- A) C_8H_{18} B) C_4H_9 C) $C_{12}H_{27}$ D) C_8H_{36}

14) Given that $4 NH_3 + 5 O_2 \rightarrow 4 NO + 6 H_2O$, if 3.00 mol NH_3 were made to react with excess of oxygen gas, the amount of H_2O formed would be:

- A) 2.00 mol.
B) 4.50 mol.
C) 3.00 mol.
D) 6.00 mol.

15) What is the mass percent of carbon in oxalic acid, $H_2C_2O_4$?

- A) 13.3
B) 26.7
C) 34.5
D) 2.24

16) Given: $2 N_2 + 5 O_2 \rightarrow 2 N_2O_5$

Which of the following is *not* a valid equality?

- A) 5 mol $O_2 = 2$ mol N_2O_5 B) 5 mol $O_2 = 2$ mol N_2
C) 2 mol $N_2 = 2$ mol O_2 D) 2 mol $N_2O_5 = 2$ mol N_2

17) How many waffles can be made from 1 dozen eggs, assuming you have enough of all other ingredients?

Recipe: 2 cups flour + 3 eggs + 1 tbs oil \rightarrow 4 waffles

- A) 4 B) 12 C) 16 D) 48

- 1) C 2) C 3) A 4) A 5) B 6) B 7) D 8) C 9) B 10) B
11) B 12) C 13) A 14) B 15) B 16) C 17) C

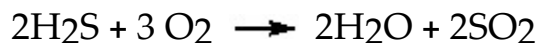
Free Response Section Practice

The following are given in multiple choice format for practice, but the actual test will be free response. Show all work for full or partial credit.

18) Nicotine (C₁₀H₁₄N₂) is a byproduct of the tobacco industry and is used as an agricultural insecticide. Calculate the percent composition of each element in nicotine.

- A) 70.2% C 10.5% H 10.3% N
B) 74.0% C 8.71% H 17.3% N
C) 90.0% C 1.50% H 8.50% N
D) 83.7% C 4.45% H 11.9% N

19) Which of the following is the correct "set-up" for the problem "How many grams of H₂O will be produced from 3.2 moles of O₂ and an excess of H₂S" according to the following reaction:



- A) $3.2 \text{ moles O}_2 \times \frac{2 \text{ moles H}_2\text{O}}{3 \text{ moles O}_2} \times \frac{18.02 \text{ g H}_2\text{O}}{1 \text{ mole H}_2\text{O}}$
B) $3.2 \text{ moles O}_2 \times \frac{18.02 \text{ g H}_2\text{O}}{2 \text{ moles H}_2\text{O}}$
C) $3.2 \text{ moles O}_2 \times \frac{32.00 \text{ g O}_2}{1 \text{ mole O}_2} \times \frac{18.02 \text{ g H}_2\text{O}}{32.00 \text{ g O}_2}$
D) $3.2 \text{ moles O}_2 \times \frac{32.00 \text{ g O}_2}{1 \text{ mole O}_2} \times \frac{2 \text{ moles H}_2\text{O}}{3 \text{ moles O}_2}$

20) For the reaction: $2\text{P} + 3\text{Cl}_2 \longrightarrow 2\text{PCl}_3$, if 32.5 g of Cl₂ reacts completely with excess P, how many grams of PCl₃ will be produced?

- A) 83.9 g B) 94.4 g C) 42.0 g D) 62.9 g

21) How many grams of sodium metal are needed to make 29.3 grams of sodium chloride?

Given the reaction: $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$

- A) 11.5
B) 46.0
C) 23.0
D) 5.75

Answer Key 18) B 19) A 20) C 21) A