

Chapter 3 TEST: Stoichiometry

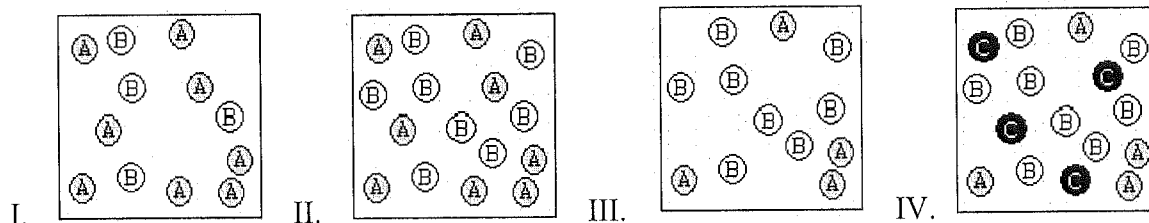
- The atomic mass of rhenium is 186.2. Given that 37.1% of natural rhenium is rhenium-185, what is the other stable isotope?
 - ${}^{183}_{75}\text{Re}$
 - ${}^{187}_{75}\text{Re}$
 - ${}^{189}_{75}\text{Re}$
 - ${}^{181}_{75}\text{Re}$
 - ${}^{190}_{75}\text{Re}$
- Consider the element indium, atomic number 49, atomic mass 114.8 g. The nucleus of an atom of indium-112 contains
 - 49 protons, 63 neutrons, 49 electrons
 - 49 protons, 49 neutrons
 - 49 protons, 49 alpha particles
 - 49 protons, 63 neutrons
 - 49 protons, 112 neutrons
- What is the mass of 4 atom(s) of copper in grams?
 - 254.2 g
 - 2.37×10^{21} g
 - 9.57×10^{-24} g
 - 6.022×10^{23} g
 - 4.22×10^{-22} g
- How many moles of hydrogen sulfide are contained in a 49.7-g sample of this gas?
 - 0.686 mol
 - 1.46 mol
 - 83.8 mol
 - 24.7 mol
 - 2.92 mol
- Phosphoric acid can be prepared by reaction of sulfuric acid with "phosphate rock" according to the equation:
$$\text{Ca}_3(\text{PO}_4)_2 + 3\text{H}_2\text{SO}_4 \rightarrow 3\text{CaSO}_4 + 2\text{H}_3\text{PO}_4$$
What is the molar mass of $\text{Ca}_3(\text{PO}_4)_2$?
 - 310.18 g/mol
 - 87.05 g/mol
 - 278.18 g/mol
 - 215.21 g/mol
 - 166.02 g/mol

6. What is the mass of a 6.761-mol sample of sodium hydroxide?
- A) 40.00 g
 - B) 270.4 g
 - C) 162.3 g
 - D) 5.916 g
 - E) 0.1690 g
7. An oxide of iron has the formula Fe_3O_4 . What mass percent of iron does it contain?
- A) 0.72%
 - B) 28%
 - C) 30%
 - D) 70%
 - E) 72%
8. Which of the following compounds has the same percent composition by mass as styrene, C_8H_8 ?
- A) acetylene, C_2H_2
 - B) benzene, C_6H_6
 - C) cyclobutadiene, C_4H_4
 - D) α -ethyl naphthalene, $\text{C}_{12}\text{H}_{12}$
 - E) all of these
9. The molar mass of an insecticide, dibromoethane, is 187.9 g/mol. Its molecular formula is $\text{C}_2\text{H}_4\text{Br}_2$. What percent by mass of bromine does dibromoethane contain?
- A) 42.52%
 - B) 2.14%
 - C) 85.05%
 - D) 12.78%
 - E) 6.39%
10. Ammonium chromate, $(\text{NH}_4)_2\text{CrO}_4$, contains what percent nitrogen by mass?
- A) 36.8%
 - B) 9.2%
 - C) 18.4%
 - D) 11.9%
 - E) none of these
11. The empirical formula of styrene is CH ; its molar mass is 104.1 g/mol. What is the molecular formula of styrene?
- A) C_2H_4
 - B) C_8H_8
 - C) $\text{C}_{10}\text{H}_{12}$
 - D) C_6H_6
 - E) none of these

12. Adipic acid contains 49.32% C, 43.84% O, and 6.85% H by mass. What is the empirical formula?
- A) $C_3H_5O_2$
 - B) $C_3H_3O_4$
 - C) C_2HO_3
 - D) $C_2H_5O_4$
 - E) C_3HO_3
13. In balancing an equation, we change the _____ to make the number of atoms on each side of the equation balance.
- A) formulas of compounds in the reactants
 - B) coefficients of compounds
 - C) formulas of compounds in the products
 - D) subscripts of compounds
 - E) none of these
14. What is the coefficient for water when the following equation is balanced?
- $$As(OH)_3(s) + H_2SO_4(aq) \rightarrow As_2(SO_4)_3(aq) + H_2O(l)$$
- A) 1
 - B) 2
 - C) 4
 - D) 6
 - E) 12
15. What is the coefficient for oxygen when the following equation is balanced?
- $$NH_3(g) + O_2(g) \rightarrow NO_2(g) + H_2O(g)$$
- A) 3
 - B) 6
 - C) 7
 - D) 12
 - E) 14
16. What is the sum of the coefficients of the following equation when it is balanced using smallest whole numbers? $NaNH_2 + NaNO_3 \rightarrow NaN_3 + NaOH + NH_3$
- A) 5
 - B) 6
 - C) 7
 - D) 8
 - E) 9
17. Potassium forms an oxide containing 1 oxygen atom for every 2 atoms of potassium. What is the coefficient of oxygen in the balanced equation for the reaction of potassium with oxygen to form this oxide?
- A) 0
 - B) 1
 - C) 2
 - D) 3
 - E) 4

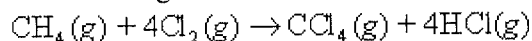
18. A reaction occurs between sodium carbonate and hydrochloric acid producing sodium chloride, carbon dioxide, and water. The correct set of coefficients, respectively, for the balanced reaction is:
- A) 3 6 6 3 4
 B) 8 6 5 10 5
 C) 5 10 10 5 5
 D) 1 2 2 1 1
 E) none of these

19. A chemical reaction has the equation: $2A + B \rightarrow C$. Which of the following figures best illustrates a stoichiometric ratio of A and B?



- A) I only
 B) II only
 C) III only
 D) IV only
 E) both I and IV
20. A 7.11-g sample of potassium chlorate was decomposed according to the following equation:
- $$2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$$
- How many moles of oxygen are formed?
- A) 2.78 g
 B) 0.0580 mol
 C) 0.0387 mol
 D) 0.0870 mol
 E) none of these

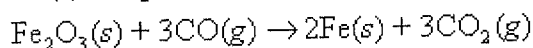
21. Consider the following reaction:



What mass of CCl_4 is formed by the reaction of 5.14 g of methane with an excess of chlorine?

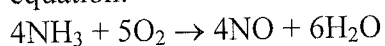
- A) 12.3 g
 B) 0.54 g
 C) 791 g
 D) 49.3 g
 E) none of these

22. The following two reactions are important in the blast furnace production of iron metal from iron ore (Fe_2O_3):



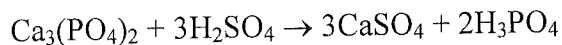
Using these balanced reactions, how many moles of O_2 are required for the production of 3.19 kg of Fe?

- A) 42.8 moles
B) 19.0 moles
C) 171 moles
D) 57.1 moles
E) 2.39 moles
23. Nitric oxide, NO, is made from the oxidation of NH_3 , and the reaction is represented by the equation:



What mass of NO can be produced from 7.55 g of NH_3 ?

- A) 4.28 g NO
B) 13.3 g NO
C) 7.55 g NO
D) 20.0 g NO
E) 16.6 g NO
24. Phosphoric acid can be prepared by reaction of sulfuric acid with "phosphate rock" according to the equation:

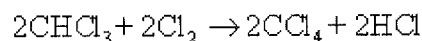


Suppose the reaction is carried out starting with 129 g of $\text{Ca}_3(\text{PO}_4)_2$ and 97.4 g of H_2SO_4 . Which substance is the limiting reactant?

- A) $\text{Ca}_3(\text{PO}_4)_2$
B) H_2SO_4
C) CaSO_4
D) H_3PO_4
E) none of these
25. How many grams of H_2O will be formed when 32.0 g H_2 is mixed with 12.0 g of O_2 and allowed to react to form water?

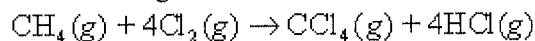
- A) 13.5 g
B) 286 g
C) 6.8 g
D) 3.4 g
E) 144 g

26. The reaction of 11.9 g of CHCl_3 with excess chlorine produced 10.2 g of CCl_4 , carbon tetrachloride:



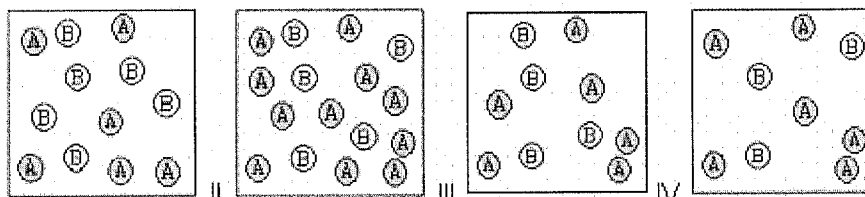
What is the percent yield?

- A) 100%
 B) 33.2%
 C) 66.3%
 D) 86%
 E) 44.2%
27. Consider the following reaction:



What mass of CCl_4 will be formed if 1.20 moles of methane react with 1.11 moles of chlorine?

- A) 185 g
 B) 171 g
 C) 683 g
 D) 42.7 g
 E) 19.7 g
28. A chemical reaction has the equation: $2\text{A} + \text{B} \rightarrow \text{C}$. In which case is B the limiting reactant?



- A) I
 B) II
 C) III
 D) IV
 E) none of these
29. Equal masses (in grams) of hydrogen gas and oxygen gas are reacted to form water. Which substance is limiting?
- A) Oxygen gas is limiting.
 B) Hydrogen gas is limiting.
 C) Water is limiting.
 D) Nothing is limiting.
 E) More information is needed to answer this question.
30. What is the molar mass of tetraphosphorus decaoxide?
- A) 140 g/mol
 B) 410 g/mol
 C) 253 g/mol
 D) 204 g/mol
 E) 284 g/mol