

Part I. Multiple Choice

For Problems 1-2, choose the correct number of significant figures for each number given.

1. 12.030 a. 2 b. 3 c. 4 d. 5 e. it's ambiguous
 2. 2.000×10^2 a. 1 b. 2 c. 3 d. 4 e. 5

For Problems 3 - 4, choose the calculated answer with the correct number of significant figures.

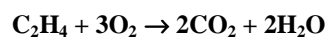
3. $13.002 + 0.05$ a. 13 b. 13.1 c. 13.05 d. 13.052
 4. $1.53 + 8.470 =$ a. 10. b. 10.0 c. 10.00 d. 10.000
 5. $1.00 \times 10^{-5} \times (27.0 - 24.0) =$ a. 3×10^{-5} b. 3.0×10^{-5} c. 3.00×10^{-5} d. 3.000×10^{-5}
6. How many grams are there in 0.0325 kg ?
 a. 325 b. 32.5 c. 3250 d. 0.325 e. 0.00325
7. What is the volume of 5.00 g of carbon tetrachloride given that the density of carbon tetrachloride is 1.59 g/mL?
 a. 7.95 mL b. 0.126 mL c. 3.14 mL d. 0.318 mL e. cannot be determined
8. Which of the following atoms commonly forms a monatomic ion with a -2 charge?
 I. S II. C III. O IV. Be
 a. I&II b. II&III c. I&III d. I&IV e. III&IV
9. Which of the following ions is isoelectronic with (has the same electron distribution as) Ar?
 I. S^{2-} II. Cl^- III. Sc^{2+}
 a. I&II b. I&III c. II&III d. none are e. all are
10. Which of the following bonds would be expected to be ionic?
 I. Hg-Cl II. N-O III. H-C
 a. I only b. II only c. III only d. all are e. none are
11. Which of the following compounds is ionic?
 I. $Mg(NO_3)_2$ II. NH_4Cl III. PCl_3
 a. I only b. II only c. III only d. I and II e. II and III
12. Rank the following bonds from most to least ionic.
 I. Na-NH₂ II. H-BeH III. Li-CH₃
 a. I>II>III b. I>III>II c. II>I>III d. II>III>I e. III>II>I

13. The chemical properties of nitrogen would be most similar to
 a. P b. Cl c. Ar d. C e. As
14. About 1909, Robert Milliken performed experiments by ionizing droplets of oil between charged plates and adjusting the voltage until some particles were suspended against the force of gravity. When combined with Thompson's experiments in measuring the deflection of cathode rays by a magnetic field, what was Milliken able to determine?
 I. The charge of an electron.
 II. The charge of a proton.
 III. The mass of an electron.
 IV. The mass of a neutron.
 a. I and II b. I and III c. II and III d. II and IV e. II and IV
15. Which of the following compounds is ionic?
 I. $\text{Mg}(\text{NO}_3)_2$ II. NH_4Cl III. PCl_3
 a. I only b. II only c. III only d. I and II e. II and III
16. How many atoms of sulfur are there in 16.0 g of sulfur?
 a. 6.022×10^{23} b. 3.01×10^{23} c. 1.000 d. 5.324×10^{-13} e. 1.880×10^{12}
17. How many moles of sulfur are there in 16.0 g of sulfur?
 a. 6.02×10^{23} b. 1.00 c. 5.18×10^{-26} d. 3.01×10^{23} e. 0.500
18. How many moles of oxygen atoms are there in 0.500 mole of $\text{Fe}_2(\text{SO}_4)_3$?
 a. 6.02×10^{23} b. 6.00 c. 1.50 d. 3.00 e. 48.0

For Problems 19-21, give the name of the compound shown.

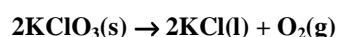
19. FeBr_3
 a. iron bromide b. iron tribromide c. iron III bromide
 d. iron bromate e. iron III bromate
20. K_2O
 a. potassium oxide b. potassium dioxide c. dipotassium oxide
 d. potassium I oxide e. potassium II oxide
21. H_2SO_4
 a. hydrogen sulfide b. dihydrogen sulfide c. dihydrogen sulfite
 d. sulfurous acid e. sulfuric acid

22. How many moles of CO_2 would be produced by the complete reaction of 4.00 mole of O_2 according to the following balanced equation?



- a. 2.67 b. 3.00 c. 6.00 d. 4.00 e. 8.00
23. When 10.0 g of potassium chlorate was decomposed according to the following balanced equation, a student obtained 5.00 g of potassium chloride. What was the percent yield?

($\text{FW}_{\text{KClO}_3} = 122.55 \text{ g/mol}$, $\text{FW}_{\text{KCl}} = 74.55 \text{ g/mol}$, $\text{FW}_{\text{O}_2} = 32.00 \text{ g/mol}$)



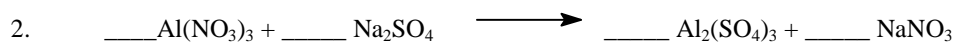
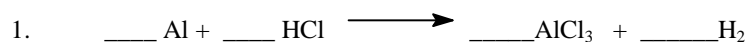
- a. 6.08% b. 16.4% c. 30.4% d. 50.0% e. 82.2%

Part II. Short Answer

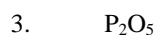
A. Give the symbol for each of the following elements.

(Followed by a bunch of elements)

B. Balance the following equations.

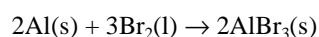


B. Give the names of the following compounds. (9 pts, 3pt/ea)



Part III. Essay

1. What is the mass percent carbon in malonic acid, $\text{C}_3\text{H}_4\text{O}_4$?
2. Experiment shows that a 4.740 g sample of a compound contains 2.402 g of carbon, 0.470 g of hydrogen, and 1.868 g of nitrogen by weight. What is the empirical formula of the compound?
3. Aluminum burns in bromine, producing aluminum bromide:



A chemist reacts 20.0g of aluminum is reacted with 100.0g of bromine and isolates 90.0g of aluminum bromide. What is his percent yield?

Molar masses: $\text{Al}(\text{s})$ 26.98g $\text{Br}_2(\text{l})$ 159.8g $\text{AlBr}_3(\text{s})$ 266.68g