

Workbook



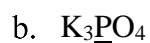
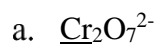
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Chemical Compounds

Introduction to Periodic Table

1) Indicate the oxidation state of the underlined atom in:



Answer Key

- 1) a. +6 b. +5 c. +6 d. -1
 e. +4 f. 0 g. -1 h. +5

Calculations Involving Moles

Questions

- 1) Calculate the total number of:
 - a. atoms in one molecule of methionine, $C_5H_{11}NO_2S$
 - b. atoms in 0.00304 mol hexanol, $CH_3(CH_2)_4CH_2OH$.
 - c. F atoms in 11.45 mol halothane, $C_2HBrClF_3$
- 2) Trinitrotoluene (TNT) has the molecular formula $CH_3C_6H_2(NO_2)_3$.
Determine:
 - a. its molecular mass.
 - b. the number of moles of H atoms per mole of TNT.
 - c. the number of grams of C per mole of TNT.
 - d. the number of C atoms in 8.57 mol TNT.
- 3) Determine the mass percent of H in the hydrocarbon hexane, C_6H_{14} .
- 4) Determine the mass percent of each of the elements in methionine, $C_5H_{11}NO_2S$.
- 5) Calculate the percent composition of hexanol, $CH_3(CH_2)_4CH_2OH$.
Determine the empirical formula of a carbon-hydrogen compound, which consists of 82.63% C and 17.37% H by mass.
- 6) Determine the empirical formula of a carbon-hydrogen-oxygen compound, with 39.99% C, 6.73% H, and 53.28% O, by mass.
- 7) A compound has a percent composition, by mass, of 74.03% C, 7.47% H, 8.64% N and 9.86% O. Determine the molecular formula of the compound.
The molecular mass of the compound is 324.5 u.

General Chemistry Workbook

- 8) Write balanced equations to represent the complete combustion of:
- Butane, C_4H_{10} .
 - Sucrose, $C_{12}H_{22}O_{11}$
- 9) A 3.244 g sample of phenol, C_6H_5OH , is burned in an excess of oxygen. What masses of CO_2 and H_2O should be obtained?
- 10) Anhydrous $CuSO_4$ can be used to dry liquids in which it is insoluble. The $CuSO_4$ is converted to $CuSO_4 \cdot 5H_2O$, which can be filtered off, from the liquid. What is the minimum mass of anhydrous $CuSO_4$ needed to remove 14.2 g H_2O , from a tankful of gasoline?

Answer Key

- 1) a. 227.15 *u* b. 5 moles c. 84.07 g d. $3.61 \cdot 10^{25}$ atoms.
- 2) a. 20 atoms b. $3.84 \cdot 10^{22}$ atoms c. $2.07 \cdot 10^{25}$ atoms.
- 3) 16.40% *H*
- 4) 40.24% *C*, 7.44% *H*, 9.39% *N*, 21.44% *O* and 21.49% *S*.
- 5) 70.51% *C*, 13.84% *H*, and 15.66% *O*.
- 6) C_2H_5
- 7) CH_2O
- 8) $C_{20}H_{24}$
- 9) a. $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2$ b. $C_{12}H_{22}O_{11} + 12O_2 \rightarrow 12CO_2 + 11H_2O$.
- 10) CO_2 mass = 9.24 g
 H_2O mass = 1.89 g.
 $CuSO_4$ mass = 25.22 g.