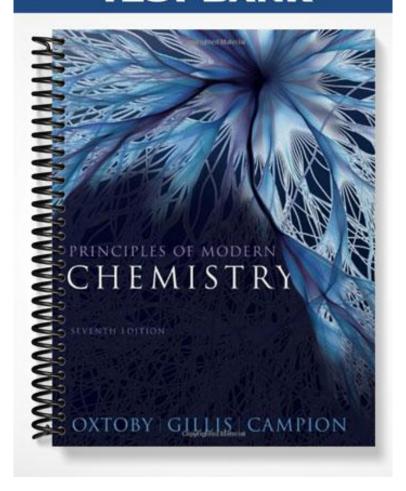
TEST BANK



bb 6-7 Ch02

- 1. If the relative atomic mass of ⁵⁶Fe is 55.935 (on the ¹²C scale), what is the mass of one ⁵⁶Fe atom?
 - A. 3.37′10⁻²⁵ g B. 1.66′10₋₂₄ g C. 7.74′10⁻²³ g D. 9.29′10₋₂₂ g E. 3.37′10 g
- Which has the greatest number of hydrogen atoms?
 - A. 10^{20} hydrogen atoms
 - B. 100 g of water
 - C. 5 g of an unknown compound
 - D. 20 g of hydrogen gas
 - E. 100 g of a substance that is 2% H by mass
- Which of these carbohydrates has the largest molecular mass?

 - A. threose (C H O)
 B. ribose (C H O)
 C. glucose (C H O)
 D. sucrose (C H O)
 E. raffinose (C₁₈H₂O)
 E. raffinose (C₁₈H₃O)
- What is the relative molecular mass of the compound trinitrotoluene, C₇H₅N₃O₆ (on the ¹²C scale)?
 - A. 43.03
 - B. 205.13
 - C. 215.13
 - D. 227.13
 - E. 278.03
- 5. Assume a kernel of wheat has a volume of 8 mm³. How many moles of wheat kernels can fit in the world's largest grain elevator with a capacity of 20 million bushels (1 bushel = 35.24 L)?
 - A. 1.17'10⁻¹²
 B. 1.42'10⁻¹³
 C. 1.46'10⁻⁷
 D. 1.46'10⁻⁶
 E. 1.42'10⁻⁶

6.	Vitamin B $_{12}$, cyanocobalamin, has the molecular formula, $\rm C_{68}H_{88}CoN_{14}O_{14}P.$ What is the percent mass of cobalt in this compound?
	A. 1.02% B. 4.35% C. 10.3% D. 22.3% E. 23.2%
7.	Which of the following carbohydrates has the largest percent mass of carbon?
	A. threose (C ₄ H ₈ O ₄) B. ribose (C ₄ H ₈ O ₄) C. glucose (C ₆ H ₁ O ₆) D. sucrose (C ₆ H ₂ O ₁) E. raffinose (C ₁₈ H ₃₂ O ₁₆)
8.	Magnetite is a mineral compound that is 72.36% iron and 27.64% oxygen by mass. What is the empirical formula for the compound that makes up magnetite?
	A. FeO B. Fe O C. Fe ² O D. Fe ² O ³ E. Fe ³ O ²
9.	You have 25.0 g of a compound that contains only silicon and nitrogen. Chemical analysis reveals that your sample contains 15.0 g of silicon. What is the empirical formula for your compound?
	A. SiN B. Si N C. Si ³ N ⁴ D. SiN E. Si N
10.	You have a compound that contains only carbon and hydrogen. If you burn the compound at high temperature in the presence of oxygen it is completely converted to CO ₂ and H ₂ O. When you react 20.0 g of your sample you generate 62.7 g of CO ₂ and 25.7 g of H ₂ O. Which of the following is a possible formula for your compound?
	A. C_{H} B. $C^{2}H^{2}$ C. $C^{2}H^{4}$ D. $C^{2}H^{6}$ E. $C^{3}_{3}H^{5}_{7}$

- 11. Methane CH₄ reacts with molecular oxygen, O₂, to form carbon dioxide, CO₂, and water, H₂O. In a balanced chemical equation for this reaction there will always be
 - A. the same number of moles of CO₂ and H₂O.
 - B. twice as many moles of CO₂ as H₂O.
 - C. twice as many moles of H₂O as CO₂.
 - D. twice as many moles of H_2^2O as O_2 .
 - E. twice as many moles of CÓ₂ as CH₄.
- 12. For the given unbalanced reaction

$$\times CaO(s) + y H_2O(l) \otimes z Ca(OH)_2$$

the correct stiochiometric coefficients x, y, & z are

- A. 1,1,1
- B. 1,2,1
- C. 2,1,2
- D. 2,1,1
- E. 1,1,2
- 13. Barium hydroxide reacts with hydrochloric acid to produce barium chloride and water. A balanced chemical equation for this reaction is?
 - A. Ba(OH) + HCL ® BACL + H O B. Ba(OH) + HCL ® BACL + H O

 - C. Ba(OH) + 2HCL ® BACL + 2H O D. Ba(OH) + 2HCL ® BACL + H O E. Ba(OH) + 2HCL ® BACL + H O
- 14. Which of the following is not correctly balanced?

 - A. 2 Al + 6 HCl ® 2 AlCl₃ + 3 H B. 2 C₄ H₂ + 15 O₂ ® 12 CO₂ + 6²H₂O C. 16 Cr + 3 S₈ ® 28 Cr₂S₂ D. 2 NaHCO₃ ® Na₂ CO₃ + 2 CO₂ + H₂O E. Fe₂O₃ + 2³Al ® 2²Fe + Al₂O₃
- 15. In fermentation, sucrose, C₁₂H₂O₁₁, reacts with water to form ethanol, C₂H₅OH, and carbon dioxide. A balanced chemical equation for this reaction is?

 - A. C H O (aq) + 3 H O(l) ® 5 C H OH(aq) + 2 Co (g) B. C $^{12}H^{22}O^{11}(aq) + 7$ H $^{2}O(l)$ ® 2 C $^{2}H^{5}OH(aq) + 8$ Co $^{2}(g)$ C. C $^{12}H^{22}O^{11}(aq) + 2$ H $^{2}O(l)$ ® 6 C $^{2}H^{5}OH(aq) + Co$ (g) D. C $^{12}H^{22}O^{11}(aq) + 2$ H $^{2}O(l)$ ® 4 C $^{2}H^{5}OH(aq) + 4$ Co (g) E. C $^{12}H^{22}O^{11}(aq) + H_{2}O(l)$ ® 4 C $^{2}H^{5}OH(aq) + 4$ Co (g)

- 16. Tetrasilane (Si H₁₀) is a liquid with can react with oxygen to form SiO₂ and water. How many moles of water are produced from each mole of tetrasilane that reacts?
 - A. 0.1
 - B. 2.5
 - C. 4
 - D. 5
 - E. 10
- 17. Citric acid (C₁H₂O₇) is produced from fermentation of sugars such as sucrose (C₁H₂O₁). In this process oxygen reacts with the sugar to produce citric acid and water as products. How many moles of citric acid can be produced from one mole of sucrose?
 - A. 2
 - B. 1
 - C. 0.5
 - D. 0.333
 - E. 0.1
- 18. Nitrogen gas reacts with hydrogen gas to produce ammonia.

$$3 \text{ H}_{2}(g) + \text{N}_{2}(g) \otimes 2 \text{ NH}_{3}(g)$$

How many grams of nitrogen are required to produce 1.000 g of ammonia?

- A. 0.8224
- B. 1.644
- C. 0.5000
- D. 0.6667
- E. 0.4112
- 19. Methane can be reacted with steam to produce carbon dioxide and hydrogen gas in a two step reaction. The resulting overall reaction can be written

$$CH_4(g) + 2 H_2O(g) \otimes CO_2(g) + 4 H_2(g)$$

How many grams of hydrogen can be produced from each gram of methane?

- A. 1.006
- B. 0.503
- C. 0.377
- D. 0.251
- E. 4.000

20. Magnesium will react with carbon dioxide to form magnesium oxide and carbon.

$$2 \operatorname{Mg}(s) + \operatorname{CO}_2(g) \otimes 2\operatorname{MgO}(s) + \operatorname{C}(s)$$

- 20.0 grams of magnesium react completely with excess carbon dioxide. How many grams of solid product should be formed?
- A. 20.0 grams
- B. 27.5 grams
- C. 30.0 grams
- D. 38.1 grams
- E. 40.0 grams
- 21. Calcium carbide, CaC₂, reacts with water to produce calcium hydroxide and acetylene gas, C₂H₂.

$$\operatorname{CaC}_2(s) + 2\operatorname{H}_2\operatorname{O}(l) \otimes \operatorname{Ca}(\operatorname{OH})_2(aq) + \operatorname{C}_2\operatorname{H}_2(g)$$

- How many grams of acetylene can be produced from 30.0 g of calcium carbide?
- A. 1.42 g
- B. 12.2 g
- C. 28.0 g
- D. 30.0 g
- E. 64.1 g
- 22. Ammonium perchlorate, NH_4ClO_4 , is used with aluminum as rocket fuel.

$$10 \text{ Al}(s) + 6 \text{ NH}_4 \text{ClO}_4 \otimes 4 \text{ Al}_2 \text{O}_3 + 2 \text{ AlCl}_3 + 12 \text{ H}_2 \text{O} + 3 \text{ N}_2$$

- If 100.0 g of aluminum are reacted with 60.0 g of ammonium perchlorate, how many grams of aluminum oxide are produced?
- A. 34.71 g
- B. 40.00 g
- C. 123.8 g
- D. 151.1 g
- E. 1789 g

23. Aluminum sulfide reacts with water to form aluminum hydroxide and hydrogen sulfide by the following reaction

$$Al_2S_3 + 6H_2O \otimes 2Al(OH)_3 + 3H_2S$$

If 25 g of aluminum sulfide is reacted with 25 g of water how many moles of hydrogen sulfide will be formed?

- A. 0.12 moles
- B. 0.50 moles
- C. 0.78 moles
- D. 2.0 moles
- E. 3.0 moles
- 24. Iron oxide can be reduced to iron by a reaction with carbon to form carbon monoxide

$$\operatorname{Fe_2O_3}(s) + 3\operatorname{C}(s) \otimes 2\operatorname{Fe}(s) + 3\operatorname{CO}(g)$$

If 95.0 grams of iron oxide is reacted with excess carbon yields 63 g of iron, what is the percent yield of this reaction?

- A. 12%
- B. 59%
- C. 66%
- D. 95%
- E. 100%
- 25. Acetonitrile, CH₃CN, can be synthesized from carbon monoxide, hydrogen, and ammonia in the presence of a catalyst at high temperatures by the following reaction

$$2\mathrm{CO}(g) + 2\mathrm{H}_2(g) + \mathrm{NH}_3(g) \otimes \mathrm{CH}_3\mathrm{CN}(g) + 2\mathrm{H}_2\mathrm{O}(g)$$

If 20 g of carbon monoxide, 20 g of hydrogen, and 10 g of ammonia are reacted, which will be the limiting reagent?

- A. carbon monoxide
- B. hydrogen
- C. ammonia
- D. none of them
- E. there is no way to know
- 26. Which has a larger molar volume (the volume occupied by one mole): gold (density = 19.3 g cm^{-3}) or tin (density = 7.31 g cm^{-3})?
 - A. gold
 - B. tin
 - C. they are exactly the same
 - D. there is no way to know without other information

27. Copper oxide ore, CuO, can be smelted with carbon to make copper metal and carbon dioxide.

$$2\text{CuO}(s) + C(s) \otimes 2\text{Cu}(s) + \text{CO}_{2}(g)$$

- If 100.0 of a mixed ore is smelted and produces 75.9 grams of pure copper. What percentage of the mixed ore is CuO? (You can assume the reaction yield is 100%, there is excess carbon, and that CuO is the only source of copper.)
- A. 28.0%
- B. 48.5%
- C. 75.9%
- D. 79.9%
- E. 95.0%
- 28. The hard ceramic boron carbide, B₁C₂, can be made the reaction of boron oxide, B₂O₂, with carbon in an arc furnace. How many grams of boron carbide can be made from 10.0 g of boron 20x1de?
 - A. 3.10 g
 - B. 3.97 g
 - C. 5.00 g
 - D. 10.0 g
 - E. 12.6 g
- 29. A vanadium oxide contains 56.02% vanadium by mass. What is its empirical formula?
 - A. V₂O
 - B. VO
 - C. V₂O₃ D. VO₂

 - E. $V_2 G_5$
- 30. Caffeine has the molecular formula, C₈H₁₀N₄O₂. If it is burned in excess oxygen it will form carbon dioxide, water vapor, and nitrogen gas. Which gas will be most abundant by mass?
 - A. CO.
 - B. H.Ó
 - $C. N_2^2$
 - D. they will all the be the same
 - E. it depends on the mass of caffeine
- 31. Triphenylene is an organic compound containing only carbon and hydrogen with 3 carbon atoms for every two hydrogen atoms. Which of the following is a possible molecular mass for triphenylene?
 - A. 34.0 g/mol
 - B. 228.29 g/mol
 - C. 366.8 g/mol
 - D. 400.0 g/mol
 - E. b or c could be correct

32. Sodium perbromate can be synthesized via the following reaction that gives off Xenon gas.

$$NaBrO_3 + XeF_2 + H_2O \rightarrow NaBrO_4 + 2HF + Xe$$

A reaction is started with 200.0g of NaBrO₃, 250.0g of XeF₂ and 100.0g of water. Assuming that the reaction goes to completion, and that all of the formed xenon gas is allowed to escape into the atmosphere, what will be the minimum mass of products and reactants remaining in the reaction vessel?

- A. 173.4 g
- B. 193.9 g
- C. 376.0 g
- D. 356.1 g
- E. None of the above
- 33. When acetaldehyde is treated with aqueous sodium hydroxide (in excess), aldol is formed via the following reaction in a 50% yield.

OH
$$2 \text{ CH}_{3}\text{CHO} \xrightarrow{\text{OH}^{\text{T}}, \text{H}_{2}\text{O}} \rightarrow \text{CH}_{3}^{\text{T}}\text{CHCH}_{2}\text{CHO}$$
(acetaldehyde) (aldol)

What is the minimum mass of acetaldehyde that must be used if one wants to make 100 g of aldol?

- A. 88 g
- B. 176 g
- C. 200 g
- D. 400 g
- E. 50.0 g

bb 6-7 Ch02 Key

- If the relative atomic mass of ⁵⁶Fe is 55.935 (on the ¹²C scale), what is the mass of one ⁵⁶Fe atom? 1.

 - A. 3.37′10⁻²⁵ g B. 1.66′10⁻²⁴ g C. 7.74′10⁻²³ g **D.** 9.29′10⁻²³ g E. 3.37′10 g
- 2. Which has the greatest number of hydrogen atoms?
 - A. 10²⁰ hydrogen atoms
 - B. 100 g of water
 - C. 5 g of an unknown compound
 - **D.** 20 g of hydrogen gas
 - E. 100 g of a substance that is 2% H by mass
- 3. Which of these carbohydrates has the largest molecular mass?
 - A. threose (C₄H₀O₄)

 - A. threose (C, H, 804)
 B. ribose (C, H, 804)
 C. glucose (C, H, 60)
 D. sucrose (C, H, 20)
 E. raffinose (C, H, 20)
 18 132 016)
- What is the relative molecular mass of the compound trinitrotoluene, $C_7H_5N_3O_6$ (on the ^{12}C scale)? 4.
 - A. 43.03
 - B. 205.13
 - C. 215.13
 - **D.** 227.13
 - E. 278.03
- Assume a kernel of wheat has a volume of 8 mm³. How many moles of wheat kernels can fit in the 5. world's largest grain elevator with a capacity of 20 million bushels (1 bushel = 35.24 L)?
 - A. 1.17'10⁻¹²
 B. 1.42'10⁻¹⁰
 C. 1.46'10⁻⁷
 D. 1.46'10⁻⁶
 E. 1.42'10

6.	Vitamin B ₁₂ , cyanocobalamin, has the molecular formula, C ₆₈ H ₈₈ CoN ₁₄ O ₁₄ P. What is the percent mass of cobalt in this compound?
	A. 1.02% B. 4.35% C. 10.3% D. 22.3% E. 23.2%
7.	Which of the following carbohydrates has the largest percent mass of carbon?
	A. threose (C ₄ H ₀ O ₄) B. ribose (C ₁ H ₀ O ₄) C. glucose (C ₁ H ₀ O ₁) D. sucrose (C ₁ H ₂ O ₁) E. raffinose (C ₁₈ H ₃ O ₁₆)
8.	Magnetite is a mineral compound that is 72.36% iron and 27.64% oxygen by mass. What is the empirical formula for the compound that makes up magnetite?
	A. FeO B. Fe O C. Fe ² O D. Fe ² O ³ E. Fe ³ O ²
9.	You have 25.0 g of a compound that contains only silicon and nitrogen. Chemical analysis reveals that your sample contains 15.0 g of silicon. What is the empirical formula for your compound?
	A. SiN B. Si N C. Si ³ N ⁴ D. SiN E. Si ₂ N
10.	You have a compound that contains only carbon and hydrogen. If you burn the compound at high temperature in the presence of oxygen it is completely converted to CO ₂ and H ₂ O. When you react 20.0 g of your sample you generate 62.7 g of CO ₂ and 25.7 g of H ₂ O. Which of the following is a possible formula for your compound?
	A. C H B. C ² H ² C. C ² H ⁴ D. C ² H ⁶ E. C ₃ ³ H ₇

- Methane CH₄ reacts with molecular oxygen, O₂, to form carbon dioxide, CO₂, and water, H₂O. In a 11. balanced chemical equation for this reaction there will always be
 - A. the same number of moles of CO₂ and H₂O.
 - B. twice as many moles of CO_2 as $H_2^{\prime}O$.
 - C. twice as many moles of H₂O as CO₂.
 - D. twice as many moles of H_2^2O as O_2 .
 - E. twice as many moles of CO₂ as CH₄.
- 12. For the given unbalanced reaction

$$\times CaO(s) + y H_2O(l) \otimes z Ca(OH)_2$$

the correct stiochiometric coefficients x, y, & z are

- **A.** 1,1,1
- B. 1,2,1
- C. 2,1,2
- D. 2,1,1
- E. 1,1,2
- 13. Barium hydroxide reacts with hydrochloric acid to produce barium chloride and water. A balanced chemical equation for this reaction is?
 - A. Ba(OH)₂ + HCL ® BACL₂ + H₂O
 - B. $Ba(OH)^2 + HCL \otimes BACL + H_2O'$

 - C. Ba(OH) + 2HCL ® BACL + 2H O D. Ba(OH) + 2HCL ® BACL + H O E. Ba(OH) + 2HCL ® BACL + H O E. Ba(OH) + 2HCL ® BACL + H O
- Which of the following is not correctly balanced? 14.
 - A. $2 \text{ Al} + 6 \text{ HCl} \otimes 2 \text{ AlCl}_{2} + 3 \text{ H}_{2}$

 - B. 2 C H + 15 O ® 12 CO + 6²H O C. 16 Cr + 3 S ® R Cr S 2

 D. 2 NaHCO ® Na CO 3 + 2 CO + H O E. Fe O 3 + 2 All ® 2 Fe + Al O 3
- In fermentation, sucrose, C₁₂H₂₂O₁₁, reacts with water to form ethanol, C₂H₅OH, and carbon dioxide. A balanced chemical equation for this reaction is? 15.

 - A. C. H. O. (aq) + 3 H. O(l) ® 5 C. H. OH(aq) + 2 Co. (g) B. C¹²H²²O¹¹(aq) + 7 H²O(l) ® 2 C²H⁵OH(aq) + 8 Co²(g) C. C¹²H²²O¹¹(aq) + 2 H²O(l) ® 6 C²H⁵OH(aq) + Co. (g) D. C¹²H²²O¹¹(aq) + 2 H²O(l) ® 4 C²H⁵OH(aq) + 4 Co. (g) E. C¹²H²²O¹¹(aq) + H₂O(l) ® 4 C₂H₅OH(aq) + 4 Co. (g)

- 16. Tetrasilane (Si₄H₁₀) is a liquid with can react with oxygen to form SiO₂ and water. How many moles of water are produced from each mole of tetrasilane that reacts?
 - A. 0.1
 - B. 2.5
 - C. 4
 - <u>**D.**</u> 5
 - E. 10
- 17. Citric acid (C₆H₈O₇) is produced from fermentation of sugars such as sucrose (C₁₂H₂O₁₁). In this process oxygen reacts with the sugar to produce citric acid and water as products. How many moles of citric acid can be produced from one mole of sucrose?
 - <u>**A.**</u> 2
 - B. 1
 - C. 0.5
 - D. 0.333
 - E. **0.1**
- 18. Nitrogen gas reacts with hydrogen gas to produce ammonia.
 - $3 \text{ H}_2(g) + \text{N}_2(g) \otimes 2 \text{ NH}_3(g)$
 - How many grams of nitrogen are required to produce 1.000 g of ammonia?
 - **A.** 0.8224
 - B. 1.644
 - C. 0.5000
 - D. 0.6667
 - E. 0.4112
- 19. Methane can be reacted with steam to produce carbon dioxide and hydrogen gas in a two step reaction. The resulting overall reaction can be written

$$CH_4(g) + 2 H_2O(g) \otimes CO_2(g) + 4 H_2(g)$$

- How many grams of hydrogen can be produced from each gram of methane?
- A. 1.006
- **B.** 0.503
- C. 0.377
- D. 0.251
- E. 4.000

20. Magnesium will react with carbon dioxide to form magnesium oxide and carbon.

$$2 \operatorname{Mg}(s) + \operatorname{CO}_2(g) \otimes 2 \operatorname{MgO}(s) + \operatorname{C}(s)$$

- 20.0 grams of magnesium react completely with excess carbon dioxide. How many grams of solid product should be formed?
- A. 20.0 grams
- B. 27.5 grams
- C. 30.0 grams
- **D.** 38.1 grams
- E. 40.0 grams
- 21. Calcium carbide, CaC₂, reacts with water to produce calcium hydroxide and acetylene gas, C₂H₂.

$$\operatorname{CaC}_2(s) + 2\operatorname{H}_2\operatorname{O}(l) \otimes \operatorname{Ca}(\operatorname{OH})_2(aq) + \operatorname{C}_2\operatorname{H}_2(g)$$

How many grams of acetylene can be produced from 30.0 g of calcium carbide?

- A. 1.42 g
- **B.** 12.2 g
- $C.\ 28.0\ g$
- D. 30.0 g
- E. 64.1 g
- 22. Ammonium perchlorate, NH₄ClO₄, is used with aluminum as rocket fuel.

$$10 \text{ Al}(s) + 6 \text{ NH}_4 \text{ClO}_4 \otimes 4 \text{ Al}_2 \text{O}_3 + 2 \text{ AlCl}_3 + 12 \text{ H}_2 \text{O} + 3 \text{ N}_2$$

- If 100.0 g of aluminum are reacted with 60.0 g of ammonium perchlorate, how many grams of aluminum oxide are produced?
- **A.** 34.71 g
- B. 40.00 g
- C. 123.8 g
- D. 151.1 g
- $E.\ 1789\ g$

23. Aluminum sulfide reacts with water to form aluminum hydroxide and hydrogen sulfide by the following reaction

$$Al_2S_3 + 6H_2O \otimes 2Al(OH)_3 + 3H_2S$$

If 25 g of aluminum sulfide is reacted with 25 g of water how many moles of hydrogen sulfide will be formed?

- A. 0.12 moles
- **B.** 0.50 moles
- C. 0.78 moles
- D. 2.0 moles
- E. 3.0 moles
- 24. Iron oxide can be reduced to iron by a reaction with carbon to form carbon monoxide

$$Fe_2O_3(s) + 3C(s) \otimes 2Fe(s) + 3CO(g)$$

If 95.0 grams of iron oxide is reacted with excess carbon yields 63 g of iron, what is the percent yield of this reaction?

- A. 12%
- B. 59%
- C. 66%
- **D.** 95%
- E. 100%
- 25. Acetonitrile, CH₃CN, can be synthesized from carbon monoxide, hydrogen, and ammonia in the presence of a catalyst at high temperatures by the following reaction

$$2CO(g) + 2H_2(g) + NH_3(g) \otimes CH_3CN(g) + 2H_2O(g)$$

If 20 g of carbon monoxide, 20 g of hydrogen, and 10 g of ammonia are reacted, which will be the limiting reagent?

- A. carbon monoxide
- B. hydrogen
- C. ammonia
- D. none of them
- E. there is no way to know
- 26. Which has a larger molar volume (the volume occupied by one mole): gold (density = 19.3 g cm⁻³) or tin (density = 7.31 g cm⁻³)?
 - A. gold
 - **B.** tin
 - C. they are exactly the same
 - D. there is no way to know without other information

27. Copper oxide ore, CuO, can be smelted with carbon to make copper metal and carbon dioxide.

$$2\text{CuO}(s) + C(s) \otimes 2\text{Cu}(s) + \text{CO}_{2}(g)$$

If 100.0 of a mixed ore is smelted and produces 75.9 grams of pure copper. What percentage of the mixed ore is CuO? (You can assume the reaction yield is 100%, there is excess carbon, and that CuO is the only source of copper.)

- A. 28.0%
- B. 48.5%
- C. 75.9%
- D. 79.9%
- E. 95.0%

The hard ceramic boron carbide, B₁C, can be made the reaction of boron oxide, B₂O₂, with carbon in 28. an arc furnace. How many grams of boron carbide can be made from 10.0 g of boron oxide?

- A. 3.10 g
- **B.** 3.97 g
- C. 5.00 g
- D. 10.0 g
- E. 12.6 g

A vanadium oxide contains 56.02% vanadium by mass. What is its empirical formula? 29.

- A. V.O
- B. VO
- C. V₂O₃ D. VO₂
- $\mathbf{E} \cdot \mathbf{V}_2 \mathbf{G}_5$

Caffeine has the molecular formula, C₈H₁₀N₄O₂. If it is burned in excess oxygen it will form carbon dioxide, water vapor, and nitrogen gas. Which gas will be most abundant by mass? 30.

- **A.** CO. B. H.O
- C. N_2^2
- D. they will all the be the same
- E. it depends on the mass of caffeine

Triphenylene is an organic compound containing only carbon and hydrogen with 3 carbon atoms for 31. every two hydrogen atoms. Which of the following is a possible molecular mass for triphenylene?

- A. 34.0 g/mol
- **B.** 228.29 g/mol
- C. 366.8 g/mol
- D. 400.0 g/mol
- E. b or c could be correct

32. Sodium perbromate can be synthesized via the following reaction that gives off Xenon gas.

$$NaBrO_3 + XeF_2 + H_3O \rightarrow NaBrO_4 + 2HF + Xe$$

A reaction is started with 200.0g of NaBrO₃, 250.0g of XeF₂ and 100.0g of water. Assuming that the reaction goes to completion, and that all of the formed xenon gas is allowed to escape into the atmosphere, what will be the minimum mass of products and reactants remaining in the reaction vessel?

- A. 173.4 g
- B. 193.9 g
- **C.** 376.0 g
- D. 356.1 g
- E. None of the above

33. When acetaldehyde is treated with aqueous sodium hydroxide (in excess), aldol is formed via the following reaction in a 50% yield.

$$2 CH_3CHO \xrightarrow{OH^{-}, H_2O} CH_3CHCH_2CHO$$
(acetaldehyde) (aldol)

What is the minimum mass of acetaldehyde that must be used if one wants to make 100 g of aldol?

- A. 88 g
- B. 176 g
- <u>C.</u> 200 g
- D. 400 g
- E. 50.0 g