

# Iowa End-of-Course Assessments

DRAFT

## Chemistry

### Specifications

- A) Structure of atoms
- B) Structure and properties of matter
- C) Chemical reactions
- D) Conservation of energy and increase in disorder

### Sample Items

1. Consider the chemical reaction



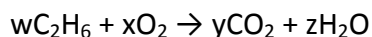
Which of the following is equal to the mass of  $\text{KClO}_3$  that is needed to produce 32.0 g of  $\text{O}_2$ ?

- A. 40.8 g
  - B. 81.7 g
  - C. 244 g
  - D. 734 g
2. Which of the following chemical reactions is best classified as an acid–base reaction?
    - A.  $\text{HCl}(aq) + \text{NaOH}(aq) \rightarrow \text{H}_2\text{O}(l) + \text{NaCl}(aq)$
    - B.  $\text{Fe}(s) + \text{Cu}^{2+}(aq) \rightarrow \text{Fe}^{2+}(aq) + \text{Cu}(s)$
    - C.  $\text{Pb}(\text{NO}_3)_2(aq) + 2\text{KI}(aq) \rightarrow \text{PbI}_2(s) + 2\text{KNO}_3(aq)$
    - D.  $\text{CaCO}_3(s) \rightarrow \text{CaO}(s) + \text{CO}_2(g)$

## Chemistry

### Sample Items cont.

3. The specific heat capacity (commonly known as specific heat) of copper is  $0.092 \text{ cal}/(\text{g}\cdot^{\circ}\text{C})$ . If a  $15.0\text{-g}$  sample of copper is heated from  $20.0^{\circ}\text{C}$  to  $350.0^{\circ}\text{C}$ , the heat absorbed by the metal sample is equal to which of the following?
- A.  $330. \text{ cal}$
  - B.  $455 \text{ cal}$
  - C.  $4.95 \times 10^3 \text{ cal}$
  - D.  $5.38 \times 10^4 \text{ cal}$
4. Consider the chemical equation shown in which the lower-case letters represent the coefficients of the reactants and products.



When correctly balanced, what will be the sum of these coefficients ( $w + x + y + z$ )?

- A. 4
  - B. 13
  - C. 17
  - D. 19
5. Which of the following terms is used to best describe a compound that has one or more molecules of water associated with each formula unit?
- A. Anhydrous salt
  - B. Hydrate
  - C. Wet compound
  - D. Ionic compound

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### Sample Items cont.

6. The maximum number of electrons that can occupy the shell with principal quantum number  $n = 4$  is equal to which of the following?
- A. 2
  - B. 8
  - C. 18
  - D. 32
7. In all, how many atoms of nitrogen are present in two formula units of  $\text{Pb}(\text{NO}_3)_2$ ?
- A. 4
  - B. 6
  - C. 10
  - D. 12

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### Sample Items cont.

Questions 8 through 10 are based on the following table, which outlines the production of the top ten inorganic chemicals produced in U.S. during one year.

<u>Chemical</u>	<u>Amount produced in billions of lbs.</u>
Sulfuric Acid	95.36
Nitrogen	68.04
Oxygen	53.48
Lime (calcium oxide)	41.23
Ammonia	35.60
Phosphoric Acid	26.19
Sodium hydroxide	26.19
Chlorine	25.09
Sodium carbonate	22.28
Nitric Acid	<u>17.24</u>
Total	410.70

8. Approximately, what percent of the total production is the production of ammonia?

- A. 8.67%
- B. 15.6%
- C. 21.4%
- D. 35.6%

10. Approximately, what percent of the total production is the combined production of the three acids?

- A. 4.20%
- B. 6.40%
- C. 23.3%
- D. 33.8%

9. What is the combined production of the three diatomic gases in the list?

- A. 64.61 billion lbs
- B. 146.61 billion lbs
- C. 157.12 billion lbs
- D. 216.88 billion lbs

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### Sample Items cont.

11. An atom of an isotope contains 81 protons, 81 electrons, and 124 neutrons. What is the mass number of the isotope?
- A. 124
  - B. 162
  - C. 205
  - D. 286
12. The number of significant figures in the measurement 0.080 L is equal to which of the following?
- A. 1
  - B. 2
  - C. 3
  - D. 4