

Chem 1210

Midterm 1

100 points

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Name _____

Instructions:

This is a closed book, closed notebook test. You may not discuss this exam with anyone, either during or after the exam, until it has been graded and returned to you in class. You may not use any outside materials - including Periodic Tables - on this exam, except a single 3" x 5" index card and an English-foreign language dictionary if necessary. You may use a calculator to help you compute the correct answer but may not retrieve or view any reference materials that may be stored in your calculator.

Each question is worth 4 points. All questions are of equal value.

1. The number of significant figures in the number 0.0741000×10^{-4} is
- A. 7
 - B. 6
 - C. 5
 - D. 4
 - E. 3
2. The melting point of mercury is 235 K. This corresponds to
- A. -38°C
 - B. -20°C
 - C. 20°C
 - D. 38°C
 - E. 508°C
3. How many 250 mg salt tablets can be made from 250 kg of salt?
- A. 1000
 - B. 10,000
 - C. 100,000
 - D. 1,000,000
 - E. 10,000,000
4. A sample of milk is found to be contaminated with arsenic at a concentration of $1.31 \mu\text{g/L}$. What is the concentration in ounces per gallon (oz/gal)?
- $1 \text{ qt} = 946.4 \text{ mL}$
 $1 \text{ gal} = 4 \text{ qt}$
 $16 \text{ oz} = 1 \text{ lb}$
 $1 \text{ kg} = 2.2 \text{ lb}$
- A. $4.9 \times 10^{-4} \text{ oz/gal}$
 - B. $1.7 \times 10^{-7} \text{ oz/gal}$
 - C. 9 oz/gal
 - D. $4.4 \times 10^{-8} \text{ oz/gal}$
 - E. $7.4 \times 10^3 \text{ oz/gal}$

5. A car has an average fuel economy of 35 miles per gallon of gas. How many liters of gasoline will be needed for a trip of 450 km?

1 qt = 946.4 mL
1 mile = 1.609 km
1000 m = 1 km
4 qt = 1 gal
1 ft = 12 inches

- A. 25. L
B. 30. L
C. 35. L
D. 40. L
E. 45. L
6. What is the mass of a 55.5 mL sample of concentrated sulfuric acid (density = 1.84 g/mL)
- A. 30.2 g
B. 40.2 g
C. 82.0 g
D. 92.0 g
E. 102 g
7. Which if the following is an example of a chemical change?
- A. Dry ice sublimating
B. Ethanol boiling
C. Sodium chloride melting
D. The formation of water from hydrogen and oxygen
E. Iodine vaporizing
8. The following species, Se^{2-} , Kr, and Sr^{2+} , all have the same number of
- A. Protons
B. Neutrons
C. Electrons
D. Isotopes
E. Ions

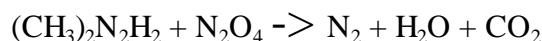
9. The nucleus of an isotope of radon, $^{222}_{86}\text{Rn}$, contains
- A. 86 protons and 136 neutrons
 - B. 86 protons and 86 electrons
 - C. 86 protons, 136 neutrons, and 86 electrons
 - D. 86 neutrons and 86 electrons
 - E. 222 protons and 86 neutrons
10. How many protons (p), neutrons (n), and electrons (e) are in the tin (II) ion $^{119}\text{Sn}^{2+}$?
- A. 119p, 50n, 119e
 - B. 69p, 50n, 69e
 - C. 50p, 119n, 52e
 - D. 50p, 69n, 50e
 - E. 50p, 69n, 48e
11. Which one of the following contains more electrons than neutrons?
- A. $^{24}\text{Mg}^{2+}$
 - B. ^{27}Al
 - C. $^{75}\text{As}^{3-}$
 - D. $^{33}\text{S}^{2-}$
 - E. ^{40}Ar
12. A new element is discovered. In the journal reporting its discovery, the element is said to contain 63.5 atomic mass units. It is probably true that the new element contains
- A. A mixture of isomers
 - B. A mixture of allotropes
 - C. A mixture of neutrons
 - D. A mixture of ions
 - E. A mixture of isotopes
13. When a certain pure solid is heated, a new solid and a gas are formed. Both the new solid and the gas are also pure substances. From this information it can be concluded with certainty that
- A. The original solid is not an element
 - B. At least one of the products is an element
 - C. Both products are elements
 - D. The new solid is a compound and the gas is an element
 - E. The new solid is an element and the gas is a compound

14. The formula for aluminum sulfite is
- A. $\text{Al}_2(\text{SO}_3)_3$
 - B. $\text{Al}_2(\text{SO}_4)_3$
 - C. $\text{Al}_2(\text{SO}_4)_2$
 - D. Al_2S_3
 - E. Al_3S_2
15. Choose the name-formula pair that does not match.
- A. Sodium sulfite Na_2S
 - B. Calcium oxide CaO
 - C. Dinitrogen tetrafluoride N_2F_4
 - D. Potassium permanganate KMnO_4
 - E. Iron (III) perchlorate $\text{Fe}(\text{ClO}_4)_3$
16. The formula for terbium phosphate is $\text{Tb}_3(\text{PO}_4)_4$. On the basis of this information the formula for terbium sulfate would be expected to be
- A. $\text{Tb}_2(\text{SO}_4)_3$
 - B. Tb_2S_3
 - C. TbS_2
 - D. $\text{Tb}(\text{SO}_3)_2$
 - E. $\text{Tb}(\text{SO}_4)_2$
17. The oxyanion that comes from nitric acid is
- A. NO^-
 - B. NO^{2-}
 - C. NO^{3-}
 - D. N_2O_3^-
 - E. HNO_3^-
18. The complete combustion of octane yields only carbon dioxide and water. The coefficient of water in the balanced equation is
- A. 17
 - B. 19
 - C. 23
 - D. 25
 - E. 34

19. Which of the following equations is properly balanced?

- A. $\text{NH}_4\text{NO}_3 \rightarrow 2 \text{H}_2\text{O} + \text{N}_2$
- B. $\text{Sn} + 4 \text{HNO}_3 \rightarrow \text{SnO}_2 + 4 \text{NO}_2 + 2 \text{H}_2\text{O}$
- C. $\text{CH}_3\text{CHO} + 3 \text{O}_2 \rightarrow 2 \text{CO}_2 + 2 \text{H}_2\text{O}$
- D. $2 \text{Na}_2\text{SO}_4 + 3 \text{Bi}(\text{NO}_3)_3 \rightarrow \text{Bi}_2(\text{SO}_4)_3 + 9 \text{NaNO}_3$
- E. $\text{Na}_2\text{CO}_3 + 2 \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2 \text{H}_2\text{O} + \text{CO}_2$

20. Energy from the reaction of dimethylhydrazine and dinitrogen tetroxide has been used to provide propulsion in space vehicles



When the equation is correctly balanced, the coefficient of nitrogen is

- A. 1
 - B. 2
 - C. 3
 - D. 4
 - E. 5
21. The molecular formula of ascorbic acid is $\text{C}_6\text{H}_8\text{O}_6$. The molar mass of ascorbic acid is
- A. 92 g/mol
 - B. 130 g/mol
 - C. 176 g/mol
 - D. 272 g/mol
 - E. 280 g/mol
22. In 0.100 moles of tetramethylhydrazine $(\text{CH}_3)_2\text{N}_2(\text{CH}_3)_2$ there are
- A. 6.02×10^{23} molecules
 - B. 6.02×10^{24} molecules
 - C. 1.82×10^{23} atoms
 - D. 6.02×10^{23} atoms
 - E. 1.08×10^{24} atoms

23. Which of the following contains the smallest number of molecules?
- A. 1 gram of benzene, C_6H_6
 - B. 1 gram of TNT, $C_7H_5N_3O_6$
 - C. 1 gram of methanal, CH_2O
 - D. 1 gram of naphthalene, $C_{10}H_8$
 - E. 1 gram of glucose, $C_6H_{12}O_6$
24. How many molecules are there in 1.00 kg of hydrazine, N_2H_4 ?
- A. 9.40×10^{21}
 - B. 1.88×10^{22}
 - C. 1.13×10^{23}
 - D. 1.88×10^{25}
 - E. 1.13×10^{26}
25. In one mole of baking soda, $NaHCO_3$, there would be
- A. 14.0 g of nitrogen
 - B. 23.0 g of sodium
 - C. 3.0 g of oxygen
 - D. 16.0 g of oxygen
 - E. 1.00 moles of H_2

Answers Chem 1210 MT1

1. B
2. A
3. D
4. B
5. B
6. E
7. D
8. C
9. A
10. E
11. D
12. E
13. A
14. A
15. A
16. E
17. C
18. D
19. B
20. C
21. C
22. E
23. B
24. D
25. B