Chem 142 A Name_____ Section No. _____
Exam 1, Trial, Su-08 J.B. Callis, Instructor

Rules for this exam:

1. Sit in your assigned seat. You must remain in your seat until the bell rings. If you finish early you are not permitted to leave or to take a book out.
2. Circle the one correct answer.
3. Do not open this exam until told to do so by the instructor.
4. This is a closed book exam. You may not have any extra sheets of paper out.
5. You may use a calculator, but not a PDA, laptop or cell phone calculator. You may not have a connection open to the Internet or to a phone line.
6. Place all books, packs, purses, etc. underneath your seat.
7. Be sure to put your name on every sheet of paper. You will not be permitted to do this after the exam ends.
8. This exam ends promptly at the end of the class period - please put down your pencil when the bell rings.
9. This exam has 25 questions. All count equally. A periodic table and two blank pages are attached to this document.
10. Do not talk to any other student for any reason. If you have a question, raise your hand and the TA will come to you.

Please sign below to indicate that you understand these rules and that you arrived at your answers without help.

Signed _____ Date _____

Formulas: T(°C) = [T(°F) - 32](5/9); T(°F) = (9/5)T(°C) + 32;

T(K) = T(°C) + 273.15

Sample standard deviation, $S_x = \sqrt{\frac{\sum (x_i - \bar{x})^2}{N-1}}$

Constants and Conversion Factors: 1 kg = 2.2046 lb;

1 lb = 453.6 g; 1 in = 2.54 cm (exactly); 1 liter = 1.0567 quarts

1 km = 0.6214 mi; 1 metric ton = 1000 kg = 2204.6 lb;

$$\rho^{solid} = \frac{m_{air}^{solid}}{V^{solid}} = \frac{m_{air}^{solid}}{\left(m_{air}^{solid} - m_{fluid}^{solid}\right)\left(1/\rho^{fluid}\right)}$$

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1. The distance between carbon atoms in ethylene is 134 picometers. Which of the following expresses that distance in meters?

A. 1.34×10^{-13} m
B. 1.34×10^{-10} m
C. 1.34×10^{-7} m
D. 1.34×10^{-6} m

2. Which of the following represents the largest volume?

A. 10,000 μL
B. 1000 pL
C. 100 mL
D. 10 nL

3. In an average year the American chemical industry produces more than 9.5 million metric tons of sodium carbonate. Over half of this is used in the manufacture of glass while another third is used in the production of detergents and other chemicals. How many pounds of sodium carbonate are produced annually?

A. 2.1×10^{10} lb
B. 4.3×10^{9} lb
C. 1.1×10^{7} lb
D. 2.2×10^{6} lb

4. Acetone, which is used as a solvent and as a reactant in the manufacture of Plexiglas®, boils at 56.1°C. What is the boiling point in degrees Fahrenheit?

A. 159°F
B. 133°F
C. 69.0°F
D. 43.4°F

5. The speed needed to escape the pull of Earth's gravity is 11.3 km/s. What is this speed in mi/h?

A. 65,500 mi/h
B. 25,300 mi/h
C. 18,200 mi/h
D. 1,090 mi/h

6. Given that 1 inch = 2.54 cm, 1 cm^3 is equal to

A. 16.4 in^3
B. 6.45 in^3
C. 0.394 in^3
D. 0.155 in^3
E. 0.0610 in^3

7. If the price of gold at the morning fixing in London was $4730 per lb, what would a kilogram of gold have cost in £ (pounds)? (Assume an exchange rate of $1.00 = £ 0.611)

A. 1310 B. 3510 C. 6370 D. 10400 E. 17100

8. A flask has a mass of 78.23 g when empty and 593.63 g when filled with water. When the same flask is filled with concentrated sulfuric acid, H_2SO_4, its mass is 1026.57 g. What is the density of concentrated sulfuric acid? (Assume water has a density of 1.00 g/cm^3 at the temperature of the measurement.)

A. 1.992 g/cm^3
B. 1.840 g/cm^3
C. 1.729 g/cm^3
D. 1.598 g/cm^3

9. Select the answer that expresses the result of this calculation with the correct number of significant figures.

$$\frac{13.602 \times 1.90 \times 3.06}{4.2 \times 1.4097} =$$

A. 13.35678 B. 13.357 C. 13.4 D. 13

10. Express 96,342 m using 2 significant figures.

A. 9.60×10^4 m B. 9.6×10^4 m
C. 9.60×10^{-4} m D. 9.6×10^{-4} m

11. The appropriate number of significant figures in the result of 15.234 - 15.208 is

A. 1 B. 2 C. 3 D. 4 E. 5

12. As chief chemist at Superior Analytical Products (SAP) you must design an experiment to determine the density of an unknown liquid to three (3) significant figures. The density is of the order of 1 g/cm^3. You have approximately 7 mL of the liquid and only graduated cylinders and balances are available for your use. Which of the following combinations of equipment will allow you to meet but not exceed your goal?

A. Graduated cylinder with ±0.1 mL uncertainty; balance with ±0.1 g uncertainty
B. Graduated cylinder with ±0.01 mL uncertainty; balance with ±0.1 g uncertainty
C. Graduated cylinder with ±0.01 mL uncertainty; balance with ±0.01 g uncertainty
D. Graduated cylinder with ±0.001 mL uncertainty; balance with ±0.001 g uncertainty

13. Kaolinite, a clay mineral with the formula $Al_4Si_4O_{10}(OH)_8$, is used as a filler in slick-paper for magazines and as a raw material for ceramics. Analysis shows that 14.35 g of kaolinite contains 8.009 g of oxygen. Calculate the mass percent of oxygen in kaolinite.

A. 24.80 mass %
B. 30.81 mass %
C. 34.12 mass %
D. 55.81 mass %

14. Rutherford bombarded gold foil with alpha (α) particles and found that a small percentage of the particles were deflected. Which of the following was <u>not</u> accounted for by the model he proposed for the structure of atoms?

A. the small size of the nucleus
B. the charge on the nucleus
C. the total mass of the atom
D. the existence of protons

15. Lithium forms compounds which are used in dry cells and storage batteries and in high-temperature lubricants. It has two naturally occurring isotopes, ^6Li (isotopic mass = 6.015121 amu) and ^7Li (isotopic mass = 7.016003 amu). Lithium has an atomic mass of 6.9409 amu. What is the percent abundance of lithium-6?

A. 86.66%
B. 46.16%
C. 7.503%
D. 6.080%

16. Which of the following is a metal?

A. nitrogen, N, $Z = 7$
B. phosphorus, P, $Z = 15$
C. arsenic, $Z = 33$
D. thallium, Tl, $Z = 81$

17. Which of the following compounds is covalent?

A. $CaCl_2$
B. MgO
C. PCl_3
D. Cs_2S

18. The compound, BaO, absorbs water and carbon dioxide readily and is used to dry gases and organic solvents. What is its name?

A. barium oxide
B. barium(II) oxide
C. barium monoxide
D. baric oxide

19. Which one of the following combinations of names and formulas of ions is incorrect?

A.	O_2^-	oxide
B.	Al^{3+}	aluminum
C.	NO_3^-	nitrate
D.	PO_4^{3-}	phosphate
E.	CrO_4^{2-}	chromate

20. The substance, $KClO_3$, is a strong oxidizer used in explosives, fireworks, and matches. What is its name?

A. potassium chlorite
B. potassium chlorate
C. potassium(I) chlorite
D. potassium(I) chlorate

21. Barium sulfate is used in manufacturing photographic paper. What is its formula?

A. $BaSO_4$ B. $Ba(SO_4)_2$
C. Ba_2SO_4 D. $Ba_2(SO_4)_3$

22. What is the formula for lithium nitrite?

A. $LiNO_2$ B. Li_2NO_2 C. $LiNO_3$ D. Li_2NO_3

23. What is the name of the acid formed when HBr gas is dissolved in water?

A. bromic acid B. bromous acid
C. hydrobromic acid D. hydrobromous acid

24. What is the name of the acid formed when HCN gas is dissolved in water?

A. cyanic acid B. hydrocyanic acid
C. cyanous acid D. hydrocyanous acid

25. What is the name of IF_7?

A. iodine fluoride
B. iodic fluoride
C. iodine heptafluoride
D. heptafluoroiodide