CHEM 1025 Exam # 1  28 Jan. 2010

Instructions: On your scantron sheet enter your name, UF ID number, and Form Code (start with the first space and leave the last space blank). This exam consists of 25 multiple choice questions each worth 8.0 points for a total maximum of 200 pts. Keep your exam sheet (mark your answers on it and on the scantron sheet). Turn in only the scantron. Any bubbling error will count as an incorrect response, including wrong form code and answers.

Potentially Useful Information: 1 inch = 2.54 cm; 12 inches = 1 foot; 1 mile = 5280 ft

1. This physical state has an indefinite shape and a fixed volume.
   (1) Crystalline solid  (2) Amorphous Solid  (3) Liquid  (4) Gas  (5) Plasma

2. Using PC for physical change and CC for chemical change, identify the following: Limestone crushed, coal burns, steam condenses, banana ripening, air expanding.  
   (1) PC, PC, PC, CC, CC  (2) PC, CC, CC, PC, PC  (3) CC, PC, PC, CC, CC  
   (4) PC, CC, PC, CC, PC  (5) CC, PC, CC, PC, CC

3. Indicate how many significant figures are in the following values:  
   (1) 0.00967  (2) 45.908  (3) 900.0  (4) 9.6700  (5) 2700

   (1) 5, 4, 3, 3, 4  (2) 3, 5, 4, 5, 2  (3) 6, 5, 1, 3, 2  
   (4) 3, 4, 4, 5, 4  (5) 5, 5, 3, 5, 2

4. Diamonds are measured in carats and one carat equals 0.200 grams. The density of diamond is 3.51 g/cm³. What is the volume in cm³ of a 5.0 carat diamond?
   (1) 3.51 cm³  (2) 3.5 cm³  (3) 1.42 cm³  (4) 0.284 cm³  (5) 0.28 cm³

5. The ⁹⁰Sr isotope is present in radioactive fallout. When ⁹⁰Sr forms an ion, how many protons, neutrons, and electrons will it have, in that order?
   (1) 38, 90, 38  (2) 38, 90, 36  (3) 38, 52, 40  (4) 38, 52, 36  (5) 38, 52, 38

6. Compound X has three isotopes: X-28, X-29, and X-30. X-28 has a mass of 28.9765 amu and is 92.2% abundant. X-29 has a mass of 28.9765 amu and is 4.67% abundant. X-30 has a mass of 28.9737 amu and is 3.10% abundant. Calculate the atomic mass of compound X.
   (1) 28.1 amu  (2) 28.0771 amu  (3) 28.08 amu  (4) 28.42 amu  (5) 28.3 amu

7. Name the following compounds: CrBr₃, FeSO₄, NO₂.
   (1) Chromium (II) bromide, iron sulfite, mononitrogen dioxide  
   (2) Chromium (I) bromide, iron (II) sulfite, nitrogen (II) oxide  
   (3) Chromium tribromide, iron sulfate, nitrogen oxide  
   (4) Chromium bromide, iron (II) sulfite, nitrogen (II) dioxide  
   (5) Chromium (III) bromide, iron sulfate, nitrogen dioxide

8. How many atoms of phosphorous are there in 7.9 g of P₄S₁₀.
   (1) 1.9 x 10²⁵  (2) 2.5 x 10²⁵  (3) 4.3 x 10²⁵  (4) 1.1 x 10³³  (5) 1.1 x 10²²

9. What is the classification of CaCO₃?
   (1) Atomic Element  (2) Molecular Element  (3) Molecular Compound  
   (4) Ionic Compound  (5) Atomic Compound

10. Which of the following does not exist as a diatomic molecule?
    (1) Nitrogen  (2) Bromine  (3) Sulfur  (4) Hydrogen  (5) Oxygen

11. A proton has a radius of approximately 1.0 x 10⁻⁸ nm and a mass of 1.7 x 10⁻²⁷ kg. Determine the density of a proton. For a sphere, \( V = \frac{4}{3}\pi r^3 \).
    (1) 4.1 x 10⁻¹⁰ g/cm³  (2) 5.7 x 10⁻¹⁰ g/cm³  (3) 4.1 x 10⁻¹⁰ g/cm³  
    (4) 1.7 x 10⁻¹ⁱ g/cm³  (5) 3.2 x 10⁻¹² g/cm³

12. Cheetahs have been recorded running at speeds of nearly 125 miles per hour. How fast is this in meters per second?
    (1) 103 m/s  (2) 102.8 m/s  (3) 97.3 m/s  (4) 73.2 m/s  (5) 55.9 m/s

13. The coldest temperature ever measured in the United States is -80.0 °F on January 23, 1971, in Prospect Creek, Alaska. What was the temperature in Kelvin?
    (1) 211 K  (2) 299.8 K  (3) 371 K  (4) 335 K  (5) 273 K

14. Perform the following calculation to the correct number of significant figure.
    \( [(1.7 \times 10^5) ÷ (2.63 \times 10^3)] + 7.33 \)
    (1) 13.8  (2) 13.79  (3) 14  (4) 10  (5) 13.794
15. A 1.0 L sample of gaseous neon atoms contains 2.69 x 10^{22} atoms per liter. The atomic radius of neon is 69 pm. What fraction of the space do the atoms themselves occupy? For a sphere, V = \frac{4}{3}\pi r^3.

(1) 3.7 x 10^{-5} \%  
(2) 3.7 x 10^{-6} \%  
(3) 3.7 x 10^{-5} \%  
(4) 0.37 \%  
(5) 3.7 \%

16. Which of the following statements was NOT a conclusion reached as a result of Rutherford’s gold foil experiment?

(1) Most of the atom’s mass and all of its positive charge are contained in the nucleus.
(2) Most of the volume of the atom is empty space.
(3) An atom has as many positively charged protons as it does negatively charged electrons.
(4) The Plum-pudding model must be incorrect.
(5) These statements are all conclusions from Rutherford’s experiment.

17. Determine which of the following samples is the heaviest:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Mass</th>
</tr>
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<tbody>
<tr>
<td>1.1 x 10^{23} gold atoms</td>
<td>2.82 x 10^{22} helium atoms</td>
</tr>
<tr>
<td>1.8 x 10^{23} lead atoms</td>
<td>7.9 x 10^{23} uranium atoms</td>
</tr>
</tbody>
</table>

(1) Gold sample  
(2) Helium sample  
(3) Lead sample  
(4) All the samples weigh the same  
(5) Insufficient information

18. A pure titanium cube has an edge length of 2.78 in. How many titanium atoms does it contain? (D_Ti = 4.50 g/cm^3).

(1) 1.22 x 10^{24} atoms  
(2) 2.00 x 10^{25} atoms  
(3) 1.57 x 10^{23} atoms  
(4) 4.00 x 10^{23} atoms  
(5) Insufficient information

19. A cylindrical piece of rubber has a mass of 16.0 g, a radius of 1.25 cm, and a height of 3.5 cm. If toluene (D=0.8669 g/mL), water (D=0.998 g/mL), and the piece of rubber are dropped into a cylinder, what will be their order in the cylinder, from bottom to top. For a cylinder, V=\pi r^2 h.

(1) Rubber, toluene, water  
(2) Toluene, rubber, water  
(3) Rubber, water, toluene  
(4) Toluene, water, rubber  
(5) None of the above

20. Bromine has 10 known isotopes, but only two occur naturally, ^79Br and ^81Br; the relative atomic masses of the two isotopes are 78.918337 amu and 80.9162906 amu, respectively. Calculate the percent abundance of each isotope.

(1) ^79Br 49.3%, ^81Br 50.7%  
(2) ^79Br 63.3%, ^81Br 36.7%  
(3) ^79Br 99.5%, ^81Br 0.5%  
(4) ^79Br 36.7%, ^81Br 63.3%  
(5) ^79Br 50.7%, ^81Br 49.3%

21. How many moles are in 60.0 g of Zn?

(1) 0.918 moles  
(2) 5.53 x 10^{23} moles  
(3) 60.0 moles  
(4) 9.96 x 10^{-23} moles  
(5) 3920 moles

22. Name the following hydrated ionic compound: CuSO_4\cdot 5H_2O

(1) Copper(III) sulfate pentahydrate  
(2) Copper(II) sulfate pentahydrate  
(3) Copper(II) sulfide heptahydrate  
(4) Copper(III) sulfide heptahydrate  
(5) Copper sulfate pentahydrate

23. Classify each of the following compounds as ionic or molecular: CF_2Cl_2, CCl_4, PtO_2, SO_3, NH_4Cl

(1) Ionic, Molecular  
(2) Ionic, Molecular  
(3) Molecular, Ionic  
(4) Molecular, Molecular  
(5) Ionic, Ionic

24. Naturally occurring iodine has an atomic mass of 126.9045 amu. A 12.3849-g sample of iodine is contaminated with 1.00070 g of ^129I, a synthetic radioisotope of iodine used in the treatment of certain diseases of the thyroid gland. The mass of ^129I is 128.9050 amu. Find the apparent “atomic mass” of the contaminated iodine.

(1) 126.931 amu  
(2) 128.632 amu  
(3) 127 amu  
(4) 127.055 amu  
(5) 127.454

25. Which of the following is FALSE regarding the syllabus?

(1) You must earn a grade of C or better in order to pass this class. 
(2) You earn two points for every clicker quiz question answered correctly, and 0.5 points for every question answered incorrectly. 
(3) You are not permitted to use graphing calculators on exams. 
(4) Four progress exams will be given and your lowest progress exam grade of the four will be dropped. 
(5) All of the above are true.