

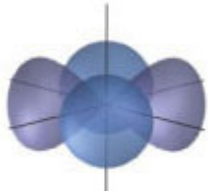
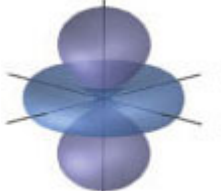
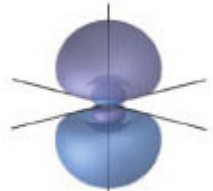
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Last KeyFirst Answer

<p>Question 1 5 Points</p>	<p>a) How many <b>significant figures</b> are there in each of the following numbers?            0.927790 <u>6</u>      0.060464 <u>5</u>      <math>1.00 \times 10^3</math> <u>3</u></p> <p>b) There are <b>12 eggs in a dozen</b>. A farm produces <b>747 dozen</b> eggs a month, how should the <b>number of eggs</b> per month be reported? <u><math>8.96 \times 10^3</math></u></p> <p>c) The number <b>447.496</b> rounded to <b>4 significant figures</b> is: <u>447.5</u></p>
<p>Question 2 4 Points</p>	<p>a) When <b>17.2</b> is <b>subtracted</b> from <b>45.58</b>, the result should be reported with <b>digit(s)</b> <u>1</u> after the decimal point.</p> <p>b) When <b>85.49</b> is divided by <b>59.6</b>, the answer should be reported to significant <b>digit(s)</b> <u>3</u>.</p>
<p>Question 3 3 Points</p>	<p>A piece of copper contains <b><math>6.7 \times 10^8</math> atoms</b>. What is the volume of the sample in units of <b>liters</b>.</p> <p>1 cm<sup>3</sup> Cu = 8.8 g Cu      <math>9.5 \times 10^{21}</math> atoms Cu = 1 g Cu      1 Kg = 1000 g            1L = 1000 cm<sup>3</sup>      1 mL = 1 cm<sup>3</sup></p> <p><b>No need to do the calculation - just set up the correct dimensional analysis conversions - you may not need to fill in all the boxes.</b></p> $6.7 \times 10^8 \text{ atoms} \times \frac{1 \text{ g Cu}}{9.5 \times 10^{21} \text{ atoms Cu}} \times \frac{1 \text{ cm}^3 \text{ Cu}}{8.8 \text{ g Cu}} \times \frac{1 \text{ L}}{1000 \text{ cm}^3}$
<p>Question 4 3 Points</p>	<p>A <b>0.0635 L</b> sample of a liquid has a mass of <b>87.6 g</b>. Identify it as either <b>nonane</b> (density = <b>0.719 g/mL</b>) or <b>iodoheptane</b> (density = <b>1.38 g/mL</b>). <u>iodoheptane</u></p>
<p>Question 5 3 Points</p>	<p>The element <b>copper</b> has two stable isotopes, <b>copper-63</b> with an atomic mass of <b>62.93 amu</b> and <b>copper-65</b> with an atomic mass of <b>64.93 amu</b>. From the atomic weight of <b>Cu = 63.54</b> one can conclude that:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>copper-65</b> has the highest percent natural abundance</li> <li><input type="checkbox"/> both isotopes have the same percent natural abundance</li> <li><input type="checkbox"/> most <b>copper</b> atoms have an atomic mass of <b>63.54</b></li> <li><input checked="" type="checkbox"/> <b>copper-63</b> has the highest percent natural abundance</li> </ul>
<p>Question 6 6 Points</p>	<p>A certain element consists of two stable isotopes. The first has an <b>atomic mass of 107 amu</b> and a percent natural abundance of <b>51.8%</b>. The second has an <b>atomic mass of 109 amu</b> and a percent natural abundance of <b>48.2%</b>. What is the <b>atomic mass</b> of the element?</p> $0.518(107) + 0.482(109) = 107.964 \text{ amu}$ <p style="text-align: right;"><u>108</u> amu</p>

<p>Question 7 3 Points</p>	<p>Decide if the following statements are true (T) or false (F):</p> <p>a) Protons and neutrons are equal in mass, but opposite in charge. <u>F</u></p> <p>b) The mass of a proton is about the same as the mass of an electron. <u>F</u></p> <p>c) The electron acts as a buffer zone in the nucleus <u>F</u></p>
<p>Question 8 10 Points</p>	<p>The following questions pertain to the periodic table given at the front of this exam:</p> <p>a. The atomic number for the element that is in group 4A and period 2? <u>6</u></p> <p>b. The atomic weight for the element in group 3A and period 4? <u>69.72</u></p> <p>c. Check the elements that would be expected to have similar properties?</p> <p><input type="checkbox"/> Pb    <input checked="" type="checkbox"/> Cl    <input type="checkbox"/> Be    <input checked="" type="checkbox"/> I    <input type="checkbox"/> Rn</p> <p>d. What is the symbol of the alkali metal that is in period 5? <u>Rb</u></p> <p>e. A student when asked to give the formula for the 7 elements that exist as diatomics, gave the following answer. Circle the incorrect answer and in the space provided give the formula for the diatomic that the students missed</p> <p><input type="checkbox"/> H<sub>2</sub>    <input type="checkbox"/> N<sub>2</sub>    <input type="checkbox"/> Br<sub>2</sub>    <input type="checkbox"/> I<sub>2</sub>    <input checked="" type="checkbox"/> At<sub>2</sub>    <input type="checkbox"/> O<sub>2</sub>    <input type="checkbox"/> Cl<sub>2</sub> :    <u>F<sub>2</sub></u></p>
<p>Question 9 3 Points</p>	<p>Order the following (from 1-3) in order of the greatest force of attraction: (1 being the greatest and 3 the smallest)</p> <p>a) K<sup>+</sup> and Cl<sup>-</sup> separated by a distance of 347 pm <u>2</u></p> <p>b) Ca<sup>2+</sup> and S<sup>2-</sup> separated by a distance of 347 pm <u>1</u></p> <p>c) K<sup>+</sup> and I<sup>-</sup> separated by a distance of 412 pm <u>3</u></p>
<p>Question 10 8 Points</p>	<p>Give the correct formula for the following polyatomic ions:</p> <p>a) Phosphide <u>P<sup>3-</sup></u></p> <p>b) Phosphate <u>PO<sub>4</sub><sup>3-</sup></u></p> <p>c) Dihydrogen phosphate <u>H<sub>2</sub>PO<sub>4</sub><sup>-</sup></u></p> <p>d) Ammonium <u>NH<sub>4</sub><sup>+</sup></u></p>
<p>Question 11 8 Points</p>	<p>a. Name the compound with the formula MgS? <u>Magnesium sulfide</u></p> <p>b. Name the compound with the formula Fe(NO<sub>2</sub>)<sub>2</sub>? <u>Iron(II) nitrite</u></p> <p>c. What is the formula for sodium hydrogen carbonate? <u>NaHCO<sub>3</sub></u></p> <p>d. What is the formula for copper(II) sulfite? <u>CuSO<sub>3</sub></u></p>
<p>Question 12 2 Points</p>	<p>How many moles of sulfur are present in 4.37 moles of S<sub>2</sub>F<sub>10</sub>? <u>Show Work</u></p> <p><u>4.37 mol S<sub>2</sub>F<sub>10</sub>   2 S</u> <u>1 S<sub>2</sub>F<sub>10</sub></u> = 8.74 mol S</p> <p><u>8.74</u> mol of S</p>

<p>Question 13 3 Points</p>	<p>How many <b>grams</b> of <math>\text{Al}_2\text{O}_3</math> are in <b>1.03 mol</b> of this compound?</p> <p><math>\text{Al}_2\text{O}_3: 2(26.98) + 3(16.00) = 101.96 \text{ g} \cdot \text{mol}^{-1}</math></p> $\frac{1.03 \text{ mol Al}_2\text{O}_3 \mid 101.96 \text{ g}}{1 \text{ mol}} = 105 \text{ g}$ <p style="text-align: right;"><u>105</u> g <math>\text{Al}_2\text{O}_3</math></p>	<p><i>Show Work</i></p>
<p>Question 14 6 Points</p>	<p>Balance the following chemical equations using the <b>smallest possible integer coefficients</b>.</p> <p>a) <u>  </u> <math>\text{Mg}_3\text{N}_2</math> (s) + <u>6</u> <math>\text{H}_2\text{O}</math> (l) <math>\longrightarrow</math> <u>3</u> <math>\text{Mg}(\text{OH})_2</math> (aq) + <u>2</u> <math>\text{NH}_3</math> (aq)</p> <p>b) The <b>complete oxidation</b> reaction that occurs when cyclopropane (<math>\text{C}_3\text{H}_6</math>) burns in air.</p> <p><u>2</u> <math>\text{C}_3\text{H}_6</math> + <u>9</u> <math>\text{O}_2</math>(g) <math>\longrightarrow</math> <u>6</u> <u><math>\text{CO}_2</math></u> + <u>6</u> <u><math>\text{H}_2\text{O}</math></u></p> <p>c) When <b>nitrogen</b> reacts with <b>hydrogen</b>, <b>ammonia</b> (<math>\text{NH}_3</math>) is formed</p> <p><u>  </u> <u><math>\text{N}_2</math></u> + <u>3</u> <u><math>\text{H}_2</math></u> <math>\longrightarrow</math> <u>2</u> <math>\text{NH}_3</math></p>	
<p>Question 15 8 Points</p>	<p>a) How <b>many orbitals</b> are there in the shell with <math>n = 3</math> in an atom?</p> <p>b) How <b>many types of orbitals</b> are there in the shell with <math>n = 3</math> in an atom?</p> <p>c) What is the <b>maximum number of electrons</b> possible in a set of <b>5d orbitals</b>?</p> <p>d) How <b>many 5f orbitals</b> are there in an atom?</p>	<p><u>9</u></p> <p><u>3</u></p> <p><u>10</u></p> <p><u>7</u></p>
<p>Question 16 6 Points</p>	<p>Label the following orbital drawings as s, p, d or f.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><u>d</u></p> </div> <div style="text-align: center;">  <p><u>d</u></p> </div> <div style="text-align: center;">  <p><u>p</u></p> </div> </div>	
<p>Question 17 5 Points</p>	<p>Using only the Periodic Table, arrange the following elements in order of <b>increasing size</b>, by ranking them <b>1 (smallest)</b> to <b>5 (largest)</b>.</p> <p><u>1</u> O      <u>5</u> Mg      <u>2</u> C      <u>3</u> Si      <u>4</u> Al</p>	
<p>Question 18 4 Points</p>	<p>Using only the Periodic Table, arrange the following elements in order of <b>increasing ionization energy</b>, by ranking them <b>1 (smallest)</b> to <b>4 (largest)</b>.</p> <p><u>3</u> Calcium      <u>1</u> Ba      <u>2</u> Sr      <u>4</u> Magnesium</p>	

Question 19  
10 Points

- a) Write the **complete** electronic configuration for **phosphorus**?  $1s^2 2s^2 2p^6 3s^2 3p^3$
- b) Write the **noble gas** configuration for **vanadium**, (V)?  $[Ar] 4s^2 3d^3$
- c) The **element** with an **electron configuration** of  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$  Mn
- d) **Se**,  $[Ar] 4s^2 3d^{10} 4p^4$ , has how many **valence electrons**? 6
- e) The element in period **4** that has the Lewis diagram,  Ge

*Do Not Write Below This*

Exam I Score