

<p>Question 6 4 Points</p>	<p>A certain element consists of two stable isotopes:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Exact Mass (amu)</th> <th>Abundance (%)</th> </tr> </thead> <tbody> <tr> <td>#1</td> <td>112.9043</td> <td>4.28</td> </tr> <tr> <td>#2</td> <td>114.9041</td> <td>95.72</td> </tr> </tbody> </table> <p>What is the average atomic mass of this element? <i>Give answer to 6 significant figures</i></p> <p style="text-align: center; color: green;"> $0.0428(112.9043) + 0.9572(114.9041)$ $= 114.818(5086) \text{ amu}$ </p> <p style="text-align: right; color: green;"><u>114.819</u> amu</p>		Exact Mass (amu)	Abundance (%)	#1	112.9043	4.28	#2	114.9041	95.72
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<p>Question 7 6 Points</p>	<p>Decide if the following statements are true (T) or false (F):</p> <p>a) Protons and neutrons are approximately equal in mass. <u>T</u></p> <p>b) The charge on a proton is the same as the charge 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>Use the Periodic Table accompanying this exam to answer the following questions:</p> <p>a) Formula for the only diatomic in Period 3. <u>Cl₂</u></p> <p>b) Symbol for the lightest Alkali Metal. <u>Li</u></p> <p>c) Symbol for transition metal in Group IB, Period 4. <u>Cu</u></p> <p>d) Plutonium (Pu) is a: (metal, nonmetal, metalloid) <u>Metal</u></p> <p>e) Group IIA are collectively known as the: <u>Alkaline Earth Metals</u></p>									
<p>Question 9 4 Points</p>	<p>Columbs Law gives that the Force of Attraction (FA) : $FA \propto q_a q_b / r^2$ where q_a is the charge on a while q_b is the charge on b and r is the distance between them.</p> <p>1. Which of the following have the greatest force of attraction:</p> <p>a. Mg²⁺ and O²⁻ separated by a distance of 419 pm</p> <p>b. Mn²⁺ and Se²⁻ separated by a distance of 295 pm <u>b</u></p> <p>2. Which of the following have the greatest force of attraction:</p> <p>a. Mg²⁺ and O²⁻ separated by a distance of 631 pm</p> <p>b. K⁺ and Cl⁻ separated by a distance of 226 pm <u>b</u></p>									
<p>Question 10 8 Points</p>	<p>Give the correct name for the following compounds:</p> <p>a) Na₂S <u>Sodium sulfide</u></p> <p>b) Mg(NO₂)₂ <u>Magnesium nitrite</u></p> <p>c) Cu₃(PO₄)₂ <u>Copper(II) phosphate</u></p> <p>d) NH₄Br <u>Ammonium bromide</u></p>									

<p>Question 11 8 Points</p>	<p>Give the correct formula for the following compounds:</p> <p>a) Calcium hydroxide <u>Ca(OH)₂</u></p> <p>b) Aluminum chlorate <u>Al(ClO₃)₃</u></p> <p>c) Chromium(II) sulfide <u>CrS</u></p> <p>d) Potassium sulfite <u>K₂SO₃</u></p>																					
<p>Question 12 3 Points</p>	<p>How many moles of Sr are there in a sample that contains 1.10×10^{22} strontium atoms? <u>Show Work</u></p> $\frac{1.10 \times 10^{22} \text{ atoms Sr}}{6.023 \times 10^{23} \text{ atoms}} = 1.83 \times 10^{-2} \text{ mol of Sr}$																					
<p>Question 13 5 Points</p>	<p>How many moles of Cu₂SO₄ are present in 1.39 grams of this compound? <u>Show Work</u></p> <p>Cu₂SO₄: $2(63.55) + 32.07 + 4(16.00)$ $= 223.17 \text{ g} \cdot \text{mol}^{-1}$</p> $\frac{1.39 \text{ g Cu}_2\text{SO}_4}{223.17 \text{ g}} = 6.23 \times 10^{-3} \text{ mol Cu}_2\text{SO}_4$																					
<p>Question 14 6 Points</p>	<p>A hydrocarbon is a compound composed purely of hydrogen and carbon. If a particular hydrocarbon is found to be composed of 89.93% C and has a molar mass of 120.21 g/mol. What is the formula of this hydrocarbon?</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>C</th> <th>H</th> <th></th> </tr> </thead> <tbody> <tr> <td></td> <td>89.93g</td> <td>10.07g</td> <td rowspan="2" style="vertical-align: middle;"><u>C₃H₄</u></td> </tr> <tr> <td></td> <td>$\frac{89.93 \text{g}}{12.01 \text{g}} = 7.488 \text{ mol}$</td> <td>$\frac{10.07 \text{g}}{1.01 \text{g}} = 9.970 \text{ mol}$</td> </tr> <tr> <td></td> <td>$\frac{7.488 \text{ mol}}{7.488 \text{ mol}} = 1.000$</td> <td>$\frac{9.970 \text{ mol}}{7.488 \text{ mol}} = 1.332$</td> <td rowspan="3" style="vertical-align: middle;">$\text{C}_3\text{H}_4: 3(12.01) + 4(1.01) = 40.07 \text{ g} \cdot \text{mol}^{-1}$</td> </tr> <tr> <td>x 2</td> <td>2.000</td> <td>2.664</td> </tr> <tr> <td>x 3</td> <td>3.000</td> <td>3.996</td> </tr> </tbody> </table> $\frac{120.21 \text{ g} \cdot \text{mol}^{-1}}{40.07 \text{ g} \cdot \text{mol}^{-1}} = 3$ <p style="text-align: right;"><u>C₉H₁₂</u></p>		C	H			89.93g	10.07g	<u>C₃H₄</u>		$\frac{89.93 \text{g}}{12.01 \text{g}} = 7.488 \text{ mol}$	$\frac{10.07 \text{g}}{1.01 \text{g}} = 9.970 \text{ mol}$		$\frac{7.488 \text{ mol}}{7.488 \text{ mol}} = 1.000$	$\frac{9.970 \text{ mol}}{7.488 \text{ mol}} = 1.332$	$\text{C}_3\text{H}_4: 3(12.01) + 4(1.01) = 40.07 \text{ g} \cdot \text{mol}^{-1}$	x 2	2.000	2.664	x 3	3.000	3.996
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Question 15
6 Points

Balance the following chemical equations using the **smallest possible integer coefficients**.



Question 16
4 Points

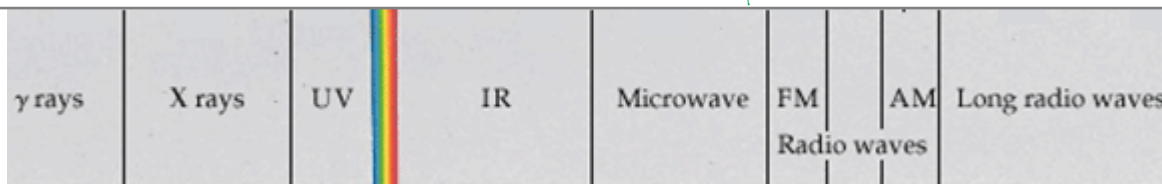
According to the following reaction, how **many moles of sulfurous acid** (H_2SO_3) will be formed upon the complete reaction of **0.260 moles sulfur dioxide** with **excess water**?



$$\frac{0.260 \text{ mol SO}_2}{1 \text{ SO}_2} \times \frac{1 \text{ H}_2\text{SO}_3}{1 \text{ SO}_2} =$$

0.260 mol H_2SO_3

Question 17
4 Points



a) Put the following forms of electromagnetic radiation in order of **increasing wavelength**?

- 1 Gamma ray
- 2 Ultraviolet
- 3 Radio wave

1. Shortest wavelength
2. Second shortest wavelength
3. Longest wavelength

b) Put the following forms of electromagnetic radiation in order of **increasing energy**?

- 1 AM
- 3 Microwave
- 2 FM

1. Smallest Energy
2. Second Highest Energy
3. Highest Energy

There is one more question on the next page

Question 18
8 Points

The wavelength of a particular color of light is 562 nm. What is the energy of this light in $\text{J}\cdot\text{mol}^{-1}$? *Show Work*

$$\frac{562 \text{ nm}}{1 \text{ nm}} \times 10^{-9} \text{ m} = 5.62 \times 10^{-7} \text{ m}$$

$$\begin{aligned} \lambda \nu &= c \\ 5.62 \times 10^{-7} \text{ m} (\nu) &= 2.998 \times 10^8 \text{ m}\cdot\text{s}^{-1} \\ \nu &= \frac{2.998 \times 10^8 \text{ m}\cdot\text{s}^{-1}}{5.62 \times 10^{-7} \text{ m}} \\ &= 5.33 \times 10^{14} \text{ s}^{-1} \end{aligned}$$

$$\begin{aligned} E &= h\nu \\ &= 6.626 \times 10^{-34} \text{ J}\cdot\text{s} \times 5.33 \times 10^{14} \text{ s}^{-1} \\ &= 3.53 \times 10^{-19} \text{ J} \end{aligned}$$

$$\begin{aligned} E &= 3.53 \times 10^{-19} \text{ J} \times 6.023 \times 10^{23} \text{ mol}^{-1} \\ &= 2.13 \times 10^5 \text{ J}\cdot\text{mol}^{-1} \end{aligned}$$

$$\boxed{2.13 \times 10^5} \text{ J}\cdot\text{mol}^{-1}$$

Do Not Write Below This

Exam I Score