

## G10 Advanced Chemistry

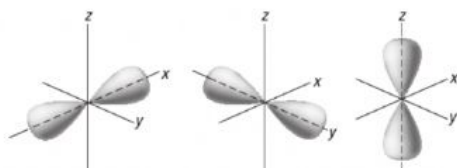
### Chapter 1 - Revision Sheet

#### Multiple Choice Questions.

Q1.	Cosmic rays are high-energy radiation from outer space. What is the frequency of a cosmic ray that has a wavelength of $2.67 \times 10^{-13}$ m when it reaches Earth? (The speed of light is $3.00 \times 10^8$ m/s.)
a.	$8.90 \times 10^{-22} \text{ s}^{-1}$
b.	$3.75 \times 10^{12} \text{ s}^{-1}$
c.	$8.01 \times 10^{-6} \text{ s}^{-1}$
d.	$1.12 \times 10^{21} \text{ s}^{-1}$

Q2.	Which is the electron-dot structure for indium?
a.	$\cdot \text{In}$
b.	$\cdot \text{In} \cdot$
c.	$\cdot \text{In} \cdot$
d.	$\cdot \text{In} \cdot$

Use the figure below to answer Questions 3 and 4.



<b>Q4.</b>	<b>How many electrons total can reside in this sublevel?</b>
<b>a.</b>	<b>2</b>
<b>b.</b>	<b>3</b>
<b>c.</b>	<b>6</b>
<b>d.</b>	<b>8</b>

<b>Q5.</b>	<b>What is the maximum theoretical number of electrons related to the fifth principal energy level of an atom?</b>
<b>a.</b>	<b>2</b>
<b>b.</b>	<b>8</b>
<b>c.</b>	<b>18</b>
<b>d.</b>	<b>32</b>

	<p>Use the periodic table and the table below to answer Questions 6 to 8.</p> <table><tr><th colspan="4">Electron Configurations for Selected Transition Metals</th></tr><tr><th>Element</th><th>Symbol</th><th>Atomic Number</th><th>Electron Configuration</th></tr><tr><td>Vanadium</td><td>V</td><td>23</td><td>[Ar]4s<sup>2</sup>3d<sup>3</sup></td></tr><tr><td>Yttrium</td><td>Y</td><td>39</td><td>[Kr]5s<sup>2</sup>4d<sup>1</sup></td></tr><tr><td></td><td></td><td></td><td>[Xe]6s<sup>2</sup>4f<sup>14</sup>5d<sup>6</sup></td></tr><tr><td>Scandium</td><td>Sc</td><td>21</td><td>[Ar]4s<sup>2</sup>3d<sup>1</sup></td></tr><tr><td>Cadmium</td><td>Cd</td><td>48</td><td></td></tr></table>	Electron Configurations for Selected Transition Metals				Element	Symbol	Atomic Number	Electron Configuration	Vanadium	V	23	[Ar]4s <sup>2</sup> 3d <sup>3</sup>	Yttrium	Y	39	[Kr]5s <sup>2</sup> 4d <sup>1</sup>				[Xe]6s <sup>2</sup> 4f <sup>14</sup> 5d <sup>6</sup>	Scandium	Sc	21	[Ar]4s <sup>2</sup> 3d <sup>1</sup>	Cadmium	Cd	48	
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Q6.	Using noble-gas notation, what is the ground-state electron configuration of Cd?																												
a.	[Kr]4d <sup>10</sup> 4f <sup>2</sup>																												
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<b>Q7.</b>	<b>What is the element that has the ground-state electron configuration [Xe]6s<sup>2</sup>4f<sup>14</sup>5d<sup>6</sup>?</b>
<b>a.</b>	<b>La</b>
<b>b.</b>	<b>Ti</b>
<b>c.</b>	<b>W</b>
<b>d.</b>	<b>Os</b>

Q8.	What is the complete electron configuration of a scandium atom?
a.	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$
b.	$1s^2 2s^2 2p^7 3s^2 3p^7 4s^2 3d^1$
c.	$1s^2 2s^2 2p^5 3s^2 3p^5 4s^2 3d^1$
d.	$1s^2 2s^1 2p^7 3s^1 3p^7 4s^2 3d^1$

Q9.	Which is NOT evidence that a chemical change has occurred?
a.	The properties of the substances involved in the reaction have changed.
b.	An odor is produced.
c.	The composition of the substances involved in the reaction have changed.
d.	The total mass of all substances involved has changed.

<p>Use the diagram below to answer Q10 and Q11</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>A. <math>\boxed{\uparrow\downarrow}</math> <math>1s^2</math></p> </div> <div style="text-align: center;"> <p>C. <math>\boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow} \boxed{\uparrow} \boxed{\uparrow}</math> <math>1s^2 \quad 2s^2 \quad 2p^3</math></p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 10px;"> <div style="text-align: center;"> <p>B. <math>\boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow}</math> <math>1s^2 \quad 2s^2</math></p> </div> <div style="text-align: center;"> <p>D. <math>\boxed{\uparrow\downarrow} \boxed{\uparrow} \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow}</math> <math>1s^2 \quad 2s^1 \quad 2p^6</math></p> </div> </div>	
Q10.	Which shows an orbital diagram that violates the Aufbau principle?
a.	A
b.	B
c.	C
d.	D

Q11.	In the diagram in Q10 Which one shows the orbital diagram for the element beryllium?
a.	A
b.	B
c.	C
d.	D

<b>Q12.</b>	<b>A student performs an experiment to measure the boiling point of pentane and measures it at 37.2°C. The literature reports this value as 36.1°C. What is the student's percent error?</b>
<b>a.</b>	<b>97.0%</b>
<b>b.</b>	<b>2.95%</b>
<b>c.</b>	<b>1.1%</b>
<b>d.</b>	<b>3.05%</b>

<b>Q13.</b>	<b>Which method of separating components of a mixture depends on the different boiling points of the components of the mixture?</b>
<b>a.</b>	<b>chromatography</b>
<b>b.</b>	<b>filtration</b>
<b>c.</b>	<b>crystallization</b>
<b>d.</b>	<b>distillation</b>

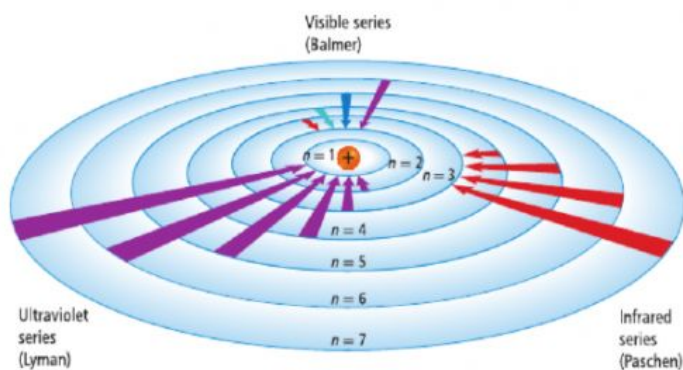
<b>Q14.</b>	<b>Germanium is an element in periodic table with the symbol Ge and an atomic number of 32. What is the correct electron configuration of Germanium?</b>
<b>a.</b>	<b>[Ar]3d<sup>9</sup>4s<sup>3</sup>4p<sup>2</sup></b>
<b>b.</b>	<b>[Ar]3d<sup>10</sup>4s<sup>2</sup>4p<sup>2</sup></b>
<b>c.</b>	<b>[Ar]3d<sup>10</sup>4s<sup>1</sup>4p<sup>3</sup></b>
<b>d.</b>	<b>[Ar]3d<sup>9</sup>4s<sup>2</sup>4p<sup>3</sup></b>

<b>Q15.</b>	<b>1s<sup>2</sup>2s<sup>2</sup>2p<sup>6</sup>3s<sup>2</sup>3p<sup>6</sup>4s<sup>2</sup>3d<sup>6</sup> is the electron configuration of which element in the periodic table?</b>
<b>a.</b>	<b>Manganese, Mn</b>
<b>b.</b>	<b>Nickel, Ni</b>
<b>c.</b>	<b>Cobalt, Co</b>
<b>d.</b>	<b>Iron, Fe</b>

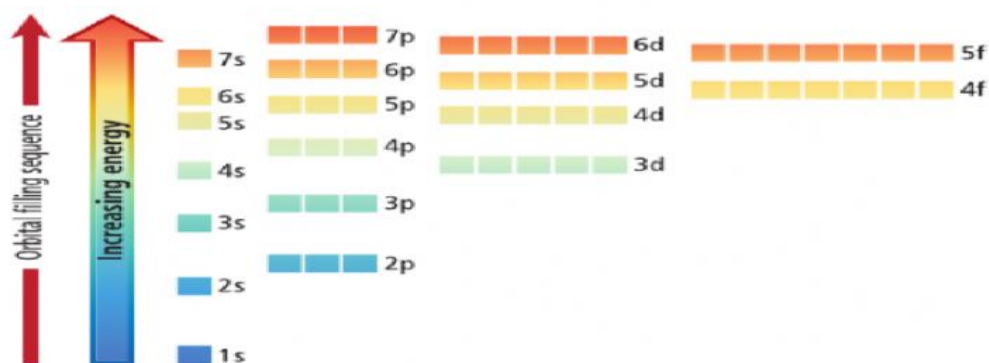
**Constructed Response Questions.**

<b>Q1</b>	
<b>a.</b>	<b>Define the following terms.</b> <b>a. frequency   b. wavelength   c. quantum   d. ground state</b>
<b>b.</b>	<b>Arrange the following types of electromagnetic radiation in order of increasing wavelength.</b> <b>a. ultraviolet light   b. microwaves   c. radio waves   d. X-rays</b>
<b>c.</b>	<b>What is the photoelectric effect?</b>

Q2



- a. What is an atomic orbital and what does  $n$  represent in the quantum mechanical model of the atom?



- b. In what sequence do electrons fill the atomic orbitals related to a sublevel?

c.	<p>What element is represented by each electron configuration?</p> <p>a. <math>1s^2 2s^2 2p^5</math></p> <p>b. <math>[\text{Ar}] 4s^2</math></p> <p>c. <math>[\text{Xe}] 6s^2 4f^4</math></p> <p>d. <math>[\text{Kr}] 5s^2 4d^{10} 5p^4</math></p> <p>e. <math>[\text{Rn}] 7s^2 5f^{13}</math></p> <p>f. <math>1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5</math></p>
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