|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **Introduction to Spectroscopy** | Name |  |

 |
|  |
|

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| $$E\_{n}=-\frac{13.6 eV}{n^{2}}$$ |  | $$E\_{photon}=\left|E\_{final}-E\_{initial}\right|$$ |  | $$λ\_{photon}=\frac{1240 eV∙nm}{E\_{photon}}$$ |

 |
|  |
| **Part I – Hydrogen Energy levels** |
|  |
|

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n | n2 | $$\frac{13.6 eV}{n^{2}}$$ | $$E\_{n}=-\frac{13.6 eV}{n^{2}}$$ |  | n | n2 | $$\frac{13.6 eV}{n^{2}}$$ | $$E\_{n}=-\frac{13.6 eV}{n^{2}}$$ |
| 1 | 1 | **13.6 eV** | **-13.6 eV** |  | 4 |  |  |  |
| 2 | 4 | **3.4 eV** | **-3.4 eV** |  | 5 |  |  |  |
| 3 |  |  |  |  | 6 |  |  |  |

 |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
| Part II – Wavelengths and Colors of Photons |
|  |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Name | InitialOrbit | FinalOrbit | $$E\_{photon}=\left|E\_{final}-E\_{initial}\right|$$ | $$E\_{photon}$$**(eV)** | $$λ\_{photon}=\frac{1240 eV∙nm}{E\_{photon}}$$ | $$λ\_{photon}$$**(nm)** | Color ofPhoton |
| Lyman | 2 | 1 | $$\left|-13.6 eV-\left(-3.4 eV\right)\right|$$$$=\left|-10.2 eV\right|=10.2 eV$$ | **10.2** | $$\frac{1240 eV∙nm}{10.2 eV}=122 nm$$ | **122** | **UV** |
| Series | 3 | 1 |  |  |  |  |  |
|  | 4 | 1 |  |  |  |  |  |
|  | 5 | 1 |  |  |  |  |  |
|  | 6 | 1 |  |  |  |  |  |
| Balmer | 3 | 2 | $$\left|-3.4 eV-\left(-1.51 eV\right)\right|$$$$=\left|-1.89 eV\right|=1.89 eV$$ | **1.89** | $$\frac{1240 eV∙nm}{1.89 eV}=656 nm$$ | **656** | **red** |
| Series | 4 | 2 |  |  |  |  |  |
|  | 5 | 2 |  |  |  |  |  |
|  | 6 | 2 |  |  |  |  |  |
| Paschen | 4 | 3 |  |  |  |  |  |
| Series | 5 | 3 |  |  |  |  |  |
|  | 6 | 3 |  |  |  |  |  |

 |
|  |
| Part III Spectra |
| **Hydrogen Calculated** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
| **656** |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
| **Red** |
|  |
|  |
|  |
|  |

 |

 |
|  |
| **Hydrogen Experimental** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
|  |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
|  |
|  |
|  |
|  |
|  |

 |

 |
|  |
| **Helium** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
|  |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
|  |
|  |
|  |
|  |
|  |

 |

 |
|  |
|  |
| **Mercury** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
|  |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
|  |
|  |
|  |
|  |
|  |

 |

 |
|  |
| **Element \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
|  |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
|  |
|  |
|  |
|  |
|  |

 |

 |
|  |
| **Element \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
|  |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
|  |
|  |
|  |
|  |
|  |

 |

 |
|  |
|  **Element \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
|  |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
|  |
|  |
|  |
|  |
|  |

 |

 |
|  |
|  **Element \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
|  |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
|  |
|  |
|  |
|  |
|  |

 |

 |
|  |
|  **Element \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
|  |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
|  |
|  |
|  |
|  |
|  |

 |

 |
|  |
|  |
|  |
| **Incandescent Light or Element \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
|  |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
|  |
|  |
|  |
|  |
|  |

 |

 |
|  |
| **Sun or Element \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
|  |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
|  |
|  |
|  |
|  |
|  |

 |

 |
|  |
| **Fluorescent Light or Element \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **UV Violet Blue Green Yellow Orange Red IR** |
|  |
| Wavelength (nm) |

 |

|  |
| --- |
| **Wavelength****(nm)** |
|  |
|  |
|  |
|  |
|  |

 |

|  |
| --- |
| **Color** |
|  |
|  |
|  |
|  |
|  |

 |

 |
| **Most Prominent Element Present? ­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |