

Quiz 8.1 – Hydrogenic Atoms

Name: _____

Hydrogen Atomic Emission

Below are the four visible light hydrogen atomic emission line wavelengths. Convert them into energy units of wavenumbers (cm^{-1}), and identify each transition's starting and ending states

Wavelength (nm)	656	486	434	410
Energy (cm^{-1})				
States				

Consider the same transitions in a hydrogenic C ion (C^{5+}). Give the transition energies and wavelengths for the same transitions in this ion.

Energy (cm^{-1})				
Wavelength (nm)				

Atomic Orbitals

Give the number of angular and radial nodes for each of the following atomic orbitals:

$3s$ $3d$ $4p$ $6f$ $6s$ $3p$

The radial node of a $2s$ wavefunction splits the orbital into two parts, like an onion with only two layers.

For a hydrogen atom, the $2s$ atomic orbital is: $\Psi = N_{2s} \left(2 - \frac{r}{a_0} \right) e^{-r/2a_0}$

Give the radial distance to the first radial node (you may express your answer in terms of the Bohr radius)

Suppose you wanted to compare the probabilities of finding a $2s$ electron inside or outside of the radial node. Give the integrals you would evaluate to find those probabilities (you don't have to solve them, but if your curiosity you it shouldn't be too difficult to do so)

Still I Rise

By Maya Angelou

You may write me down in history
With your bitter, twisted lies,
You may trod me in the very dirt
But still, like dust, I'll rise.

Does my sassiness upset you?
Why are you beset with gloom?
'Cause I walk like I've got oil wells
Pumping in my living room.

Just like moons and like suns,
With the certainty of tides,
Just like hopes springing high,
Still I'll rise.

Did you want to see me broken?
Bowed head and lowered eyes?
Shoulders falling down like teardrops,
Weakened by my soulful cries?

Does my haughtiness offend you?
Don't you take it awful hard
'Cause I laugh like I've got gold mines
Diggin' in my own backyard.

You may shoot me with your words,
You may cut me with your eyes,
You may kill me with your hatefulness,
But still, like air, I'll rise.

Does my sexiness upset you?
Does it come as a surprise
That I dance like I've got diamonds
At the meeting of my thighs?

Out of the huts of history's shame
I rise
Up from a past that's rooted in pain
I rise
I'm a black ocean, leaping and wide,
Welling and swelling I bear in the tide.

Leaving behind nights of terror and fear
I rise
Into a daybreak that's wondrously clear
I rise
Bringing the gifts that my ancestors gave,
I am the dream and the hope of the slave.
I rise
I rise
I rise.