

## Quiz 8.2 – Multi-Electron Atoms

Name: \_\_\_\_\_

**Electronic Configurations**

List the three principles which lead to proper electronic configurations

Many of the elements break from the normal pattern for electronic configurations. There are three primary modes for these deviations. Give an example of an element, with its configuration, for each of these modes

What do these exceptions to the normal pattern tell us qualitatively about the orbital energies?

**Spin States of Multi-Electron Atoms**

Consider the excited He electronic state with a configuration  $1s^1 2s^1$ . This configuration can give rise to both singlet and triplet terms

Draw energy level diagrams which illustrate the difference between these excited states

Explain one experimental difference between the singlet and triplet states of excited He

### The Pauli Principle

For the singlet state of excited He, give a valid total wavefunction which obeys the Pauli Principle

For the triplet state of excited He, give two valid total wavefunctions which obey the Pauli Principle (A third one exists, but it involves a new paradigm to derive it so we will leave it alone for now)

### True Multi-Electron Wavefunctions

True electron orbitals for multi-electron atoms are not actually identical to the hydrogenic orbitals. What theory is used to approximate the true wavefunctions for multi-electron atoms, and what factor limits its accuracy?

*A Litany for Survival*

By Audre Lorde

For those of us who live at the shoreline  
standing upon the constant edges of decision  
crucial and alone  
for those of us who cannot indulge  
the passing dreams of choice  
who love in doorways coming and going  
in the hours between dawns  
looking inward and outward  
at once before and after  
seeking a now that can breed  
futures  
like bread in our children's mouths  
so their dreams will not reflect  
the death of ours;

For those of us  
who were imprinted with fear  
like a faint line in the center of our foreheads  
learning to be afraid with our mother's milk  
for by this weapon  
this illusion of some safety to be found  
the heavy-footed hoped to silence us  
For all of us  
this instant and this triumph  
We were never meant to survive.

And when the sun rises we are afraid  
it might not remain  
when the sun sets we are afraid  
it might not rise in the morning  
when our stomachs are full we are afraid  
of indigestion  
when our stomachs are empty we are afraid  
we may never eat again  
when we are loved we are afraid  
love will vanish  
when we are alone we are afraid  
love will never return  
and when we speak we are afraid  
our words will not be heard  
nor welcomed  
but when we are silent  
we are still afraid  
So it is better to speak  
remembering  
we were never meant to survive.