Bohr's Energy Levels

- Electrons in __________ __________ __________
- __________ energy levels: __________ to __________
- __________ energy levels: __________ from __________
- Ground State: __________ in __________ __________ __________ possible

Excited Atom

- Atom has __________ __________.
- __________ state is __________.
- __________ soon __________ same amount of __________ __________.
- __________ seen as __________ __________.

The Modern View of Light

__________ has a __________ __________.

- Light may __________ as a __________.
- Light may __________ as a __________ of __________ called __________ or __________.

Spectroscopy

- __________ lines represent __________ __________ as __________ returns to __________ __________ __________.
- __________ lines __________ an __________.
- Called the __________ __________ __________ of an __________.

Orbital

__________ of __________ where an __________ is __________ to be __________

Fill in the blanks with the most appropriate term:
In Bohr's model of the atom, electrons are in certain __________ levels, with the levels closest to the nucleus of __________ energy than those farther from the nucleus. In the __________ state of the atom, the electrons are in the lowest __________ level possible. When an atom absorbs energy, it is said to be in the __________ state, which is unstable. The atom will soon ________ the same amount of energy absorbed which may be seen as visible light. In the study of __________, this visible light is seen as the ________ __________ spectrum of an element, which is also called an element's "fingerprints".

The modern view of light is that it has a __________ nature. In other words, light may behave as a stream of particles called __________ or __________, or light may behave as a __________. Modern scientists suggest that the nature of light depends on the experiment!

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Quantum Numbers

- ______________________________________
- Used to ___________ an ___________ in an ___________

n

- ___________ ___________ ___________
- Represents ___________ energy level of ___________

___________ # of ___________ in an

___________ ___________ = ___________

Example: What is the maximum number of electrons that can be in the _____ main energy level?

l

- The ___________ ___________ ___________
- Describes the ___________ ___________ within an ___________ ___________
- ___________ of orbital ___________ possible in ___________ ___________ = ___________

Orbital Shapes

designated ____________________

- level 1: ___________
- level 2: ___________
- level 3: ___________
- level 4: ___________

How many electrons can each sublevel hold?

s = 1 orbital x 2 e^-/orbital = ________e^-
p = 3 orbitals x 2 e^-/orbital = ________e^-
d = 5 orbitals x 2 e^-/orbital = ________e^-
f = 7 orbitals x 2 e^-/orbital = ________e^-

m

- The ___________ ___________ ___________
- describes ___________ of ___________ in ___________

s

- The ___________ ___________ ___________
- describes ___________ of ___________ in ___________

Ground State: ___________ energy arrangement of ___________

Examples—

hydrogen _________________ *lithium* _________________

nitrogen _________________

Orbital Notation

Examples—

hydrogen

nitrogen

Hund's Rule:

___________ of ___________ ___________ are each ___________ by one ___________ before any ___________ is occupied by a ___________ ___________.

Pauli Exclusion Principle:

No two ___________ in the ___________ ___________ can have the ___________ ___________ of ___________ ___________ ___________.

Worksheet: Energy Levels, Sublevels, Orbitals Name____________________

Energy Level n	E Sublevel (type of orbital)	# of Orbitals in Sublevel	# of e^- in Sublevel	Total # of e^- in E level ($2n^2$)
1				
2				
3				
4				

Worksheet: Electron Distributions **Name____________________**

1. There are four types of orbitals:

s : shaped like a ___________

An E level can contain only _____ s orbital, making up the "s sublevel".

p : shaped like ____________

An E level can contain _____ p orbitals, making up the "p sublevel".

d : shaped like double dumbbells

An E level can contain _____ d orbitals, making up the "d sublevel".

f : too complex to draw or describe

An E level can contain _____ f orbitals, making up the "f sublevel".

2. Each orbital can hold a maximum of _____ electrons. Since both electrons have a __________ charge, they __________. What keeps them from flying apart?

Each electron _______ on its axis. One spins __________ and the other spins _____________. When charged particles spin, they act like tiny magnets. Since the two electrons spin in ___________ directions, one acts like the north pole of a magnet and the other acts like the south pole. This makes the electrons _____________ .

3. Since each orbital can hold _____ electrons:

The "s sublevel" can hold ______ electrons.

The "p sublevel" can hold ______ electrons.

The "d sublevel" can hold ______ electrons.

The "f sublevel" can hold ______ electrons.

We use this notation to describe an electron:

main _______ level → $3p^5$ ← # of e- in __________

____

How are electrons distributed within a sublevel?

According to Hund's Rule, each __________ within a sublevel is half-filled before any is __________.

We draw **orbital diagrams** to show the distribution of electrons in a sublevel. Circles are used to represent the individual ________. __________ are used to represent electrons in the orbital. The first electron in an orbital is represented by a ↑ and the second by a ↓.

A set of four ______________ numbers is assigned to each __________ to describe its energy and location within the atom. The quantum numbers use the symbols _______, _______, _______, and _______.

_______ is the principle quantum number and represents the ________ level of the electron.
_______ represents the sublevel of the electron, which depends on the type of _____________.

Pauli's Exclusion Principle states that within an atom, no two electrons can have the same set of _____________ _____________. If two electrons have the same n, l, and m numbers, they are in the same _______ level, the same ___________, and the same _____________. They must then have ____________spins! So, the s quantum numbers must be different.

Practice: Write electron distributions and do the orbital notation for the following:

1. P :

2. Ca:

Only do the electron distributions for the following:

1. Co:

2. Eu:

3. Tc:

Worksheet: Electron Distributions Review **Name____________________**

I. Fill in the blanks:

1. The orbital shaped like a "dumb-bell" is the _____ orbital, while the orbital shaped spherically is the ______ orbital.
2. How many sublevels are present in the third main energy level?_____
3. What is the maximum number of orbitals in the "d" sublevel?_____
4. The maximum number of electrons that can occupy an orbital is _____, provided they have _____________ __________.
5. The maximum number of electrons that can occupy an energy level is represented by the formula __________.
6. The highly probable location of an electron within the atom is a(n) __________.

II. Write the electron configuration for the following:

1. Mg:________________________________
2. As:________________________________

III. In the space below, show the orbital notation for Mg:

Note Taking Guide: Episode 302 **Name**____________________

Nucleons- ___________ in the ___________ of ___________

- ___________
- ___________

Atomic Number- ___________ of ___________ in the ___________ of an ___________

Neutral atom- # of ___________ (+) = # of ___________ (-)

Isotope- ___________ of an ___________ that have ___________ ___________ of ___________.

Isotopes of Hydrogen

Hydrogen-1

- ________ proton and ________ neutrons

Hydrogen-2

- ________ proton and ________ neutrons

Hydrogen-3

- ________ proton and ________ neutrons

Mass Number- ___________ number of ___________ and ___________ in an ___________.

Example: Carbon-14 ___________________ Neon-20 ___________________

Particle	***Charge***	***Mass***	**Location**
Proton			
Neutron			
Electron			

Atomic Mass- ___________ of the ___________ of all the element's ___________