**Unit 4 Atomic Structure Study Guide**

**Vocabulary to know**

proton

neutron

electron

nucleus

atom

atomic mass

mass number

atomic number

isotope

ion

charge

element

period

group

alkali metal

alkaline earth metal

transition metal

representative metal

nonmetal

halogen

noble gas

atomic radii

ionic radii

isoelectronic series

ionization energy

electronegativity

s orbital

p orbital

d orbital

f orbital

s block

p block

d block

f block

quantum numbers

principle quantum number

angular momentum quantum number

magnetic quantum number

spin quantum number

orbital energy

Aufbau Principle

Hund’s rule

Pauli Exclusion Principle

electron configuration

orbital notation

Noble gas notation

**Memory items**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Particle** | **Symbol** | **Location** | **Charge** | **Relative Mass** | ***Actual Mass (amu)*** |
| Electron | e | Outside nucleus | -1 | $\frac{1}{1840}$ ~ 0 | *0.00055* |
| Proton | p | nucleus | +1 | 1  | *1.0073* |
| Neutron | n | nucleus | 0 | 1 | *1.0087* |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Quantum Number** | **Name** | **Allowed Values** | **Determines** | **Specifies** | **Common labels** |
| n | Principle | 1, 2, 3, 4….. | Size and Energy | Shell |  1, 2, 3,…(Period #) |
|  | Angular Momentum | 0, 1, 2… (only up to n-1) | Shape | Subshell |  s, p, d, f |
| ml | Magnetic |   | Orientation | Orbital | subscripts: x, y, z, xz, yz, z2… |
| ms | Spin | +½ or -½  | Spin | Electron |  Up ↑, Down ↓ |

States of the elements (2 liquid Hg, Br, 11 gas H, N, O, F, Cl, He, Ne, Ar, Kr, Xe, Rn, all others solid)

Molecular elements (9, including 7 diatomic elements H2, N2, O2, F2, Cl2, Br2, I2, P4, S8)

Filling order of atomic subshells (diagonal diagram or periodic table method) and the maximum number of electrons for each subshell (2, 6, 10, 14)

**Skills**

Calculate using percent composition: % = part/whole x 100

Calculate using conservation of mass

Determine average atomic mass from natural isotopic abundances and masses

Determine group #, period #, group name for an element

Rank elements based on atomic size, ionic size, ionization energy or electronegativity

State orbitals described by a given set of quantum numbers

Count electrons within shells, subshells or orbital

Write an electron configuration (Full, orbital notation and/or Noble gas notation)

**Other Review Resources**

Class powerpoints (posted online)

Homework worksheets

Personal Class notes

Review worksheet (Hint: The test will look VERY much like the Review worksheet)

After school and/or lunch meeting with teacher

**Unit 4 Test Description:**

|  |
| --- |
|  |
| 10 x 2 pts | Quantum numbers, shell, shapes, electron counting, etc…  |
| 9 pts | Subatomic particle memory items |
| 10 x 1 pt | Element designations from periodic table |
| 6 x 2 pts | Periodic trend decision with justification |
| 3 x 4 pts | Electron configurations |
| 1 x 5 pts | Percent composition calculation |
| 1 x 5 pts | Conservation of Mass problem |
| 1 x 7 pts | Atomic mass calculation |

There will be parallel versions of the test. You will not be allowed to sit next to someone with the same version. Testing folder crosses will be positioned around the center of each table to block view of same version on opposite side of table. BEWARE: YOU WILL NOT BE ALLOWED TO USE YOUR PHONE AS A CALCULATOR AND THERE ARE LIMITED CALCULATORS AVAILABLE TO BORROW. **BRING YOUR OWN CALCULATOR.** You will be asked to place your phone in your backpack at your feet or in a box on the front bench. There shall be nothing on the tables beside the test, your calculator, the vocabulary word bank, a periodic table, and a writing implement.