**Atoms, Ions, & Istopes**

* **Atomic number** = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = identity of the element

(metal/nonmetal)

* + - * + Potassium has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Atom’s Mass= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_= **mass number**

19

K

39.098

* **Isotope**:
* Same\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Same\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Different\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Different\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **Average Atomic Mass** is a weighted average of each isotope’s \_\_\_\_\_\_\_\_\_ for an element.
  + Potassium’s average mass of all isotopes is \_\_\_\_\_\_\_\_\_\_\_\_ amu.
* **Atom versus Ion**

19p+ =19 e- therefore # p+ \_\_\_\_ # e-

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

# p+ \_\_\_\_ # e-

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

18 e-

Symbol

Symbol

19 e-

* You Try:

# p+ \_\_\_\_ # e-

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

10 e-

Symbol

Symbol

8 e-

# p+ \_\_\_\_ # e-

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Atomic Structure Practice**

1. Complete the table. All atoms are neutral.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Nuclear symbol** | **Name** | **Atomic #** | **Mass**  **#** | **# Protons** | **# Neutrons** | **# Electrons** |
| a |  |  | 32 | 72 |  |  |  |
| b |  |  | 13 |  |  | 14 |  |
| c |  |  |  |  | 19 | 20 |  |
| d |  |  |  | 51 |  |  | 23 |
| e |  |  |  | 56 |  | 30 |  |
| f |  |  |  | 11 |  | 6 |  |

1. Complete the table. All atoms are neutral.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Nuclear Symbol** | **Name** | **# Protons** | **# Neutrons** | **# Electrons** |
| a | 27  Al  13 |  |  |  |  |
| b | 79  Br  35 |  |  |  |  |
| c | 40  Ca  20 |  |  |  |  |
| d | 84  Kr  36 |  |  |  |  |

1. Complete the table. All atoms are neutral.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Hyphen**  **notation** | **Nuclear Symbol** | **# Protons** | **# Neutrons** | **# Electrons** |
| a | Carbon-14 |  |  |  |  |
| b | Bromine-81 |  |  |  |  |
| c | Cobalt-60 |  |  |  |  |
| d | Barium-137 |  |  |  |  |

1. Complete the table. All atoms (ions) have a charge.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Symbol** | **Element** | **# Protons** | **# Electrons** |
| a | Al **3+** | Aluminum |  |  |
| b | Cu**3+** |  |  |  |
| c |  | Sulfur |  | 18 |
| d | P**3-** |  |  |  |
| e | K**+** |  |  |  |
| f |  |  | 53 | 54 |
| g |  | Magnesium |  | 10 |
| h |  | Silver |  | 46 |
| i | Cl**-** |  |  |  |
| j | O**2-** |  |  |  |

**Isotopes and Calculating Average Atomic Mass**

**Example:** A sample of cesium is 75% 133Cs, 20% 132Cs, and 5 % 134Cs.

What is its average atomic mass?

Answer: 0.75 x 133 = 99.75

0.20 x 132 = 26.4

0.05 x 134 = 6.7

**Total = 132.85 amu** (atomic mass unit)

**Practice:** Determine the average atomic mass of the following mixture of isotopes.

1. 80% 127I, 17% 126I, 3% 128I
2. 15% 55Fe, 85% 56Fe
3. 95% 14N, 3% 15 N, 2% 16N
4. 98% 12C, 2% 14C

**Conclusion:** Answer the following questions about isotopes.

1. Circle the symbols that represent isotopes of the same element.

24 23 12 52 24 6

X

X

X

X

X

X

12 11 6 4 11 3

1. Answer the following questions about isotopes.
   1. In what ways are isotopes of the same element similar?
   2. In what ways are isotopes of the same element different?