BUILD AN ATOM (Standard)

**PART I: ATOM SCREEN**

*Build an Atom simulation* (<http://phet.colorado.edu/en/simulation/build-an-atom>)

1. Explore the ***Build an Atom*** simulation with your group. As you explore, talk about what you find.
   1. List two things your group observed in the simulation.
   2. What particle(s) are found in the center of the atom?

1. Play until you discover which **particle(s)** determine(s) the name of the **element** you build. What did you discover?
2. What is the **name** of the following atoms?
3. An atom with 3 protons and 4 neutrons: \_\_\_\_\_\_\_\_\_\_\_\_\_
4. An atom with 2 protons and 4 neutrons: \_\_\_\_\_\_\_\_\_\_\_\_\_
5. An atom with 4 protons and 4 neutrons: \_\_\_\_\_\_\_\_\_\_\_\_\_
6. Play with the simulation to discover which particles affect the **charge** of an atom or ion.
7. Fill in the blanks below to show your results:

Neutral atoms have the same number of protons and electrons.

Positive ions have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ protons than electrons.

Negative ions have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ protons than electrons.

1. Play with the simulation to discover what affects the **mass** number of your atom or ion.
2. What is a rule for determining the mass number of an atom or ion?

1. Practice applying your understanding by playing 1st and 2nd levels on the game screen.

PART II: Symbol SCREEN

1. Using the *Symbol* readout box, figure out **which particles** affect each component of the atomic symbol.
2. In the atomic symbol to the side, label each letter (*a*, *b*, *c*, and *d*) with:



* the **particle(s)** used to determine the letter, and
* **how** the value of each letter is determined.

1. Create a definition (using a complete sentence) for each of these items based on your labels from the atomic symbol above.
   * + - 1. Charge
         2. Atomic Number
         3. Mass Number
2. Practice applying your understanding by playing the 3rd and 4th game levels. Play until you can get all the questions correct on the 4th level.
3. In addition to atomic symbol, we can represent atoms by name and mass number.
4. Complete the table below:

|  |  |
| --- | --- |
| Symbol | Name |
|  | Carbon-12 |
|  |  |
|  |  |

PART III: ISOTOPES

1. Test your understanding of isotopes by examining the relationships between the pairs of atoms listed below:

|  |  |  |
| --- | --- | --- |
| Atom 1 | Atom 2 | Relationship between atom 1 and atom 2 |
|  |  | Isotopes  Same Atom, Not Isotopes of Each Other  Different Element |
| Carbon-12 |  | Isotopes  Same Atom, Not Isotopes of Each Other  Different Element |
| Argon-40 | Argon-41 | Isotopes  Same Atom, Not Isotopes of Each Other  Different Element |
|  | Boron-10 | Isotopes  Same Atom, Not Isotopes of Each Other  Different Element |
| An atom with 13 protons and 13 neutrons | An atom with 14 protons and 13 neutrons | Isotopes  Same Atom, Not Isotopes of Each Other  Different Element |

EXERCISES

1. The periodic table has a great deal of information about every atom. Using your periodic table, answer the following questions:
2. What is the atomic number of chlorine (Cl)? \_\_\_\_\_
3. What is the atomic number of tungsten (W)? \_\_\_\_\_
4. How many protons are there in any Cl atom?\_\_\_\_\_
5. How many protons are there in any Te atom? \_\_\_\_\_
6. ­Can you tell from the periodic table exactly how many neutrons are in an atom?

14. **Fill in all missing information:**

+

–

+

–

At. # \_\_\_\_\_\_\_\_\_

At. Mass \_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_

Symbol \_\_\_\_\_\_\_

At. # \_\_\_\_\_\_\_\_\_

At. Mass \_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_

Symbol \_\_\_\_\_\_\_

**20**

At. # \_\_\_\_\_\_\_\_\_

At. Mass \_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_

Symbol \_\_\_\_\_\_\_

**Radium**

**16**

**-1**

+

–

+

–

+

–

+

–

+

–

+

–

+

–

+

–

At. # \_\_\_\_\_\_\_\_\_

At. Mass \_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_

Symbol \_\_\_\_\_\_\_

At. # \_\_\_\_\_\_\_\_\_

At. Mass \_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_

Symbol \_\_\_\_\_\_\_

At. # \_\_\_\_\_\_\_\_\_

At. Mass \_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_

Symbol \_\_\_\_\_\_\_

At. # \_\_\_\_\_\_\_\_\_

At. Mass \_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_

Symbol \_\_\_\_\_\_\_

At. # \_\_\_\_\_\_\_\_\_

At. Mass \_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_

Symbol \_\_\_\_\_\_\_

At. # \_\_\_\_\_\_\_\_\_

At. Mass \_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_

Symbol \_\_\_\_\_\_\_

At. # \_\_\_\_\_\_\_\_\_

At. Mass \_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_

Symbol \_\_\_\_\_\_\_

**26**

**92**

**18**

**34**

**41**

**As**

**35**

**24**

**11**

**10**

**17**

**-2**

**Cl**

**20**

**Neutral**

**K**

**80**

**-1**

**226**

**40**

**244**

**94**

**+3**

**56**

**18**

**40**