

## Various Nuclei

Isotopes: Nuclei having the same number of protons (atom number) but different numbers of neutrons

| Element   | Symbol    | Number of protons | Isotopes                          |                           |
|-----------|-----------|-------------------|-----------------------------------|---------------------------|
|           |           |                   | Stable                            | Radioactive               |
| Hydrogen  | <b>H</b>  | <b>1</b>          | <b>H-1, H-2*</b>                  | <b>H-3*</b>               |
| Carbon    | <b>C</b>  | <b>6</b>          | <b>C-12, C-13</b>                 | <b>C-11, C-14, ..</b>     |
| Potassium | <b>K</b>  | <b>19</b>         | <b>K-39, K-41</b>                 | <b>K-40, K-42, ..</b>     |
| Strontium | <b>Sr</b> | <b>38</b>         | <b>Sr-84, Sr-86, Sr-87, Sr-88</b> | <b>Sr-89, Sr-90, ..</b>   |
| Iodine    | <b>I</b>  | <b>53</b>         | <b>I-127</b>                      | <b>I-125, I-131, ..</b>   |
| Cesium    | <b>Cs</b> | <b>55</b>         | <b>Cs-133</b>                     | <b>Cs-134, Cs-137, ..</b> |
| Uranium   | <b>U</b>  | <b>92</b>         | None                              | <b>U-235, U-238, ..</b>   |
| Plutonium | <b>Pu</b> | <b>94</b>         | None                              | <b>Pu-238, Pu-239, ..</b> |

\*: H-2 is called deuterium and H-3 is called tritium.

". ." means that there are further more radioactive materials. Naturally occurring radioactive materials are shown in [blue letters](#).

While most hydrogen atoms are H-1 whose nucleus has only one proton, there are also H-2 (deuterium) that has one proton and one neutron and H-3 (tritium) that has one proton and two neutrons. Only H-3 (tritium) emits radiation among these isotopes.

Like hydrogen, there are elements (collectively referring to the same type of atoms) having only one type of radioactive nucleus, but there are also many elements having multiple types of radioactive nuclei. Some elements with a large atomic number such as uranium and plutonium do not have stable nuclei that do not emit radiation.

While most naturally occurring radionuclides have existed since the birth of the earth, there are some that are still being created by the interaction between cosmic rays and the atmosphere, such as Carbon-14.

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