

## CONCEPT: HYDROGEN ISOTOPES

- Hydrogen possesses \_\_\_\_ isotopes.

Hydrogen Isotopes		
Protium	Deuterium	Tritium
$\begin{array}{ c } \hline {}^1_1\text{H} \\ \hline \end{array}$	$\begin{array}{ c } \hline {}^2_1\text{H} \\ \hline \end{array}$ OR $\begin{array}{ c } \hline {}^2_1\text{D} \\ \hline \end{array}$	$\begin{array}{ c } \hline {}^3_1\text{H} \\ \hline \end{array}$
<ul style="list-style-type: none"><li>_____ abundant</li><li>___ proton &amp; ___ neutrons</li></ul>	<ul style="list-style-type: none"><li>Less than _____ abundance</li><li>___ proton &amp; ___ neutrons</li></ul>	<ul style="list-style-type: none"><li>Very scarce &amp; _____</li><li>___ proton &amp; ___ neutrons</li></ul>

- $\text{D}_2\text{O}$ : water composed with *deuterium* isotope.

- Much \_\_\_\_\_, has \_\_\_\_\_ melting and boiling points and is \_\_\_\_\_ than regular water.

- Tritium Note:** see Beta Decay topic for more info on radioactive reactions.

**EXAMPLE:** How are the three isotopes differ from each other? Select correct statement.

- a) Protium is half the mass of tritium due to the difference in number of neutrons.
- b) Deuterium is more abundant than protium.
- c) All three isotopes possess slightly different electron configurations.
- d) Tritium is the only radioactive isotope of H and is the rarest of the three.

**PRACTICE:** Select the correct explanation of how  $\text{D}_2\text{O}$  varies from  $\text{H}_2\text{O}$ .

- a) Heavy water contains the second most abundant isotope of H, while regular water contains the most abundant isotope.
- b) Water containing deuterium is radioactive.
- c) Heavy water is composed of 2 tritium atoms and 1 O atom; regular water is composed of 2 protium atoms and 1 O atom.
- d) Chemical properties of heavy water are identical to those of regular water.