• Balance the following nuclear reactions by identifying the missing nuclear particle or nuclide.

\[ ^{36}_{17}\text{Cl} + _{0}^{0}\text{e} \rightarrow \]

\[ ^{3}_{2}\text{He} + _{1}^{1}\text{H} \rightarrow ^{4}_{2}\text{He} + \]

\[ ^{14}_{7}\text{N} + _{0}^{1}\text{n} \rightarrow _{1}^{1}\text{p} + \]

• Calculate the atomic mass of sulfur from the isotope information provided.

<table>
<thead>
<tr>
<th>Isotope</th>
<th>Mass of isotope (a.m.u.)</th>
<th>Relative abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>$^{32}\text{S}$</td>
<td>31.97207</td>
<td>95.0%</td>
</tr>
<tr>
<td>$^{33}\text{S}$</td>
<td>32.97146</td>
<td>0.76%</td>
</tr>
<tr>
<td>$^{34}\text{S}$</td>
<td>33.96786</td>
<td>4.22%</td>
</tr>
<tr>
<td>$^{36}\text{S}$</td>
<td>35.96709</td>
<td>0.014%</td>
</tr>
</tbody>
</table>

Answer:

• Calculate the molar activity of $^{43}\text{K}$ (in Ci), given its half-life of 22.4 hours.

Answer:
- Balance the following nuclear reactions by identifying the missing nuclear particle or nuclide.

\[ ^1\text{H} + ^1\text{H} \rightarrow ^2\text{H} + \_\_ \]

\[ ^2\text{H} + \_\_ \rightarrow ^3\text{He} \]

\[ ^3\text{He} + ^3\text{He} \rightarrow \_\_ + ^1\text{H} + ^1\text{H} \]

Where might these reactions occur naturally?

- The half life of $^{131}\text{I}$ is 8.06 days. Calculate the activity, in Bq, of 12.0 g of pure $^{131}\text{I}$. Calculate the specific activity of $^{131}\text{I}$ in Ci mol$^{-1}$.

Answer: Bq

Answer: Ci mol$^{-1}$
• Balance the following nuclear reactions by identifying the missing nuclear particle or nuclide.

\[
^{56}_{26}\text{Fe} + ^{0}_{1}\text{e} \rightarrow \_
\]

\[
^{2}_{1}\text{H} + ^{1}_{1}\text{H} \rightarrow ^{3}_{2}\text{He} + \_
\]

\[
^{15}_{7}\text{N} + ^{1}_{1}\text{p} \rightarrow ^{15}_{8}\text{O} + \_
\]

• Calculate the atomic mass of silicon from the isotope information provided.

<table>
<thead>
<tr>
<th>Isotope</th>
<th>Mass of isotope (a.m.u.)</th>
<th>Relative abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>$^{28}\text{Si}$</td>
<td>27.97693</td>
<td>92.21%</td>
</tr>
<tr>
<td>$^{29}\text{Si}$</td>
<td>28.97649</td>
<td>4.70%</td>
</tr>
<tr>
<td>$^{30}\text{Si}$</td>
<td>29.97376</td>
<td>3.09%</td>
</tr>
</tbody>
</table>

Answer:

• Calculate the molar activity of $^{3}\text{H}$ (in Curie), given its half-life of 12.26 years.

Answer: