Week 2 Nuclear 1, Decay and Stability

QUESTION 1
Which combination of number of protons, number of neutrons and isotope symbol is correct?

<table>
<thead>
<tr>
<th>numbers of protons</th>
<th>number of neutrons</th>
<th>symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 54</td>
<td>88</td>
<td>$^{142}_{54}$Mn</td>
</tr>
<tr>
<td>B. 144</td>
<td>54</td>
<td>$^{144}_{54}$Xe</td>
</tr>
<tr>
<td>C. 17</td>
<td>46</td>
<td>$^{53}_{46}$Pd</td>
</tr>
<tr>
<td>D. 47</td>
<td>156</td>
<td>$^{103}_{47}$Ag</td>
</tr>
<tr>
<td>E. 98</td>
<td>151</td>
<td>$^{249}_{98}$Cf</td>
</tr>
</tbody>
</table>

QUESTION 2
What is the missing product in this nuclear reaction?

$$\frac{59}{27}\text{Co} + \frac{2}{1}\text{H} \rightarrow \frac{60}{27}\text{Co} + ?$$

QUESTION 3
In the following nuclear reaction, what are the values of x and y?

$$\frac{230}{90}\text{Th} \rightarrow \frac{4}{2}\text{He} + \frac{x}{y}\text{M}$$

<table>
<thead>
<tr>
<th></th>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>226</td>
<td>90</td>
</tr>
<tr>
<td>B.</td>
<td>230</td>
<td>88</td>
</tr>
<tr>
<td>C.</td>
<td>226</td>
<td>88</td>
</tr>
<tr>
<td>D.</td>
<td>228</td>
<td>86</td>
</tr>
<tr>
<td>E.</td>
<td>234</td>
<td>92</td>
</tr>
</tbody>
</table>

QUESTION 4
The element to the left has a neutron to proton ratio slightly higher than needed to place it on the belt of stability. What type of radioactive decay is it likely to undergo?

A. α emission  
B. β emission  
C. electron capture  
D. positron emission  
E. fusion

QUESTION 5
Which of the following isotopes is most likely to be a positron emitter?

A. $^{25}\text{Si}$  
B. $^{27}\text{Mg}$  
C. $^{32}\text{Si}$  
D. $^{25}\text{Mg}$  
E. $^{28}\text{Si}$
QUESTION 6

Which one of the following types of nuclear decay results in an increase in the nuclear charge?

A. alpha emission
B. positron emission
C. beta emission
D. electron capture
E. gamma emission

QUESTION 7

\(^{55}_{25}\text{Mn}\) can be prepared by electron capture from which isotope?

A. \(^{55}_{24}\text{Cr}\)
B. \(^{55}_{26}\text{Fe}\)
C. \(^{56}_{25}\text{Mn}\)
D. \(^{56}_{23}\text{V}\)
E. \(^{56}_{26}\text{Fe}\)

QUESTION 8

Write the balanced nuclear equation for the reaction pictured in the diagram below.