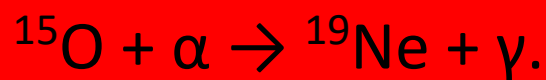




BREAKOUT!

While you wait for your decay:

Flip a coin, if you get tails
you undergo:



Go to ^{19}Ne .

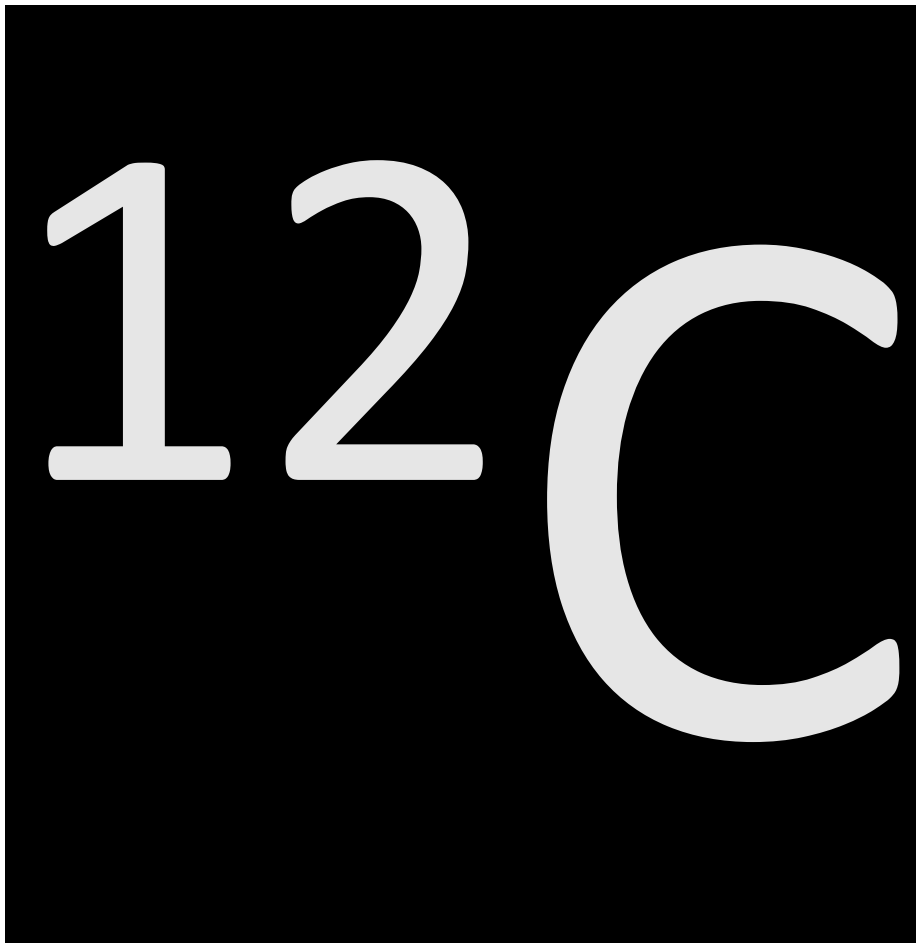


BREAKOUT!

Flip a coin. If you get tails,
go to ^{21}Na through:

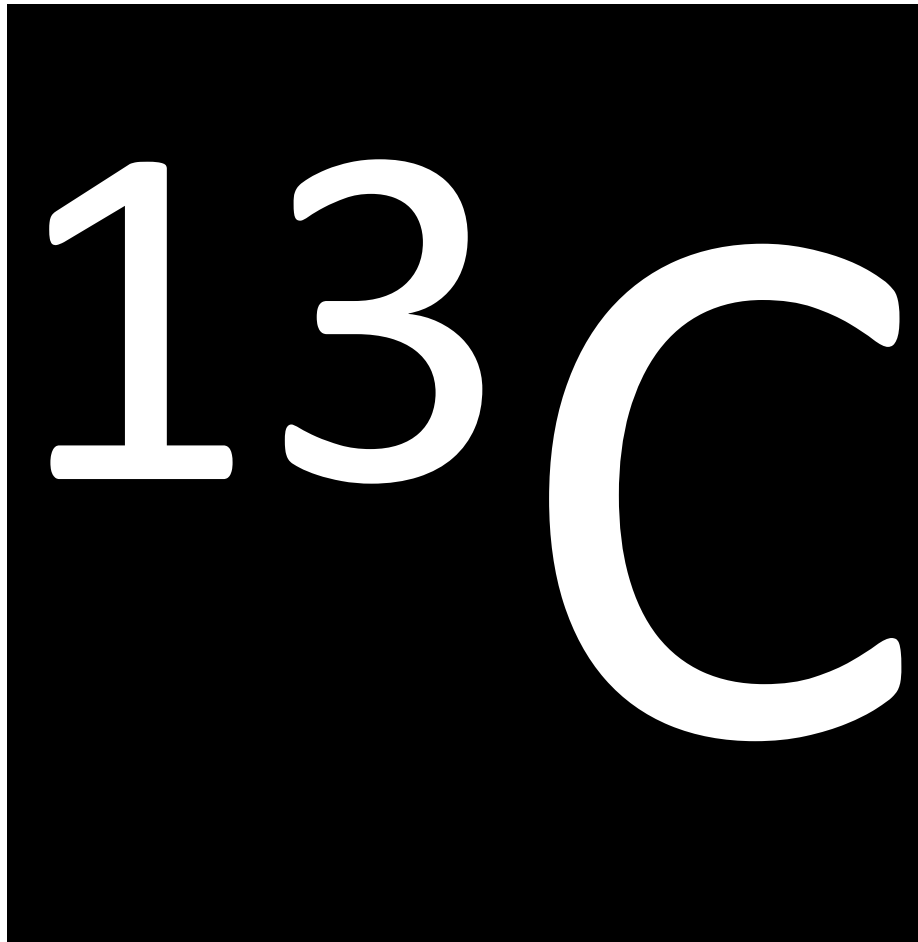


^{18}Ne is so short lived, that you only
get one chance to break out.



Carbon-12 (Stable)

Keep flipping a coin until you get “heads”. When you get “heads”, you absorb a proton and become ^{13}N .



Carbon-13 (Stable)

The long ^{13}N half life means ^{13}C is only produced after catalytic fusion has stopped. In the unlikely event that you got here, keep flipping a coin. When you get “heads”, absorb a proton to become ^{14}N .

^{13}N

Nitrogen-13 (β decay to ^{13}C)

Half life: 10 min

Your β decay is too slow. Instead, keep flipping a coin until you get “heads”. When you get “heads”, you absorb a proton and become ^{14}O .



Nitrogen-14 (Stable)

Keep flipping a coin until you get “heads”. When you get “heads”, you absorb a proton and become ^{15}O .



Nitrogen-15 (Stable)

Flip a coin.

If you get “heads”, you absorb a proton and become ^{16}O , go to ^{16}O .

If you get “tails”, $^{15}\text{N} + \text{p} \rightarrow ^{12}\text{C} + \alpha$.

You have now catalysed one cycle of hydrogen fusion: $4 \times ^1\text{H} \rightarrow ^4\text{He} + 2 \times \beta$.

Continue from ^{12}C .

14O

Oxygen-14 (β decay to ^{14}N)

Half life: 71 sec

Wait 71 s and flip a coin. If you get “heads” you β decay to ^{14}N . If you get “tails”, wait and flip again.

150

Oxygen-15 (β decay to ^{15}N)

Half life: 122 sec

Wait 122 s and flip a coin. If you get “heads”, β decay to ^{15}N . If you get “tails”, wait and flip again.



Oxygen-16 (Stable)

Keep flipping a coin until you get “heads”. When you get “heads”, you absorb a proton and become ^{17}F .



Oxygen-17 (Stable)

Flip a coin until you get “heads”.

When you do so, undergo:



Congratulations, you have now catalysed one cycle of hydrogen fusion: $4 \times ^1\text{H} \rightarrow ^4\text{He} + 2 \times \beta$.

Continue from ^{14}N .

180

Oxygen-18 (Stable)

Because of the long half life of ^{18}F ,
 ^{18}O is only produced after the
catalytic reactions have stopped.



Fluorine-17 (β decay to ${}^{17}\text{O}$)

Half life: 65 sec

While you wait for your half life, keep flipping a coin. If you get “heads” before your half life is up, you absorb a proton and become ${}^{18}\text{Ne}$. Otherwise, β decay to ${}^{17}\text{O}$.

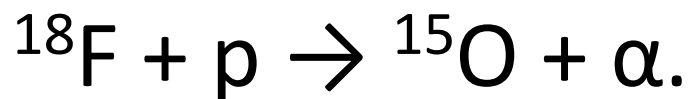
18F

Fluorine-18 (β decay to ^{18}O)

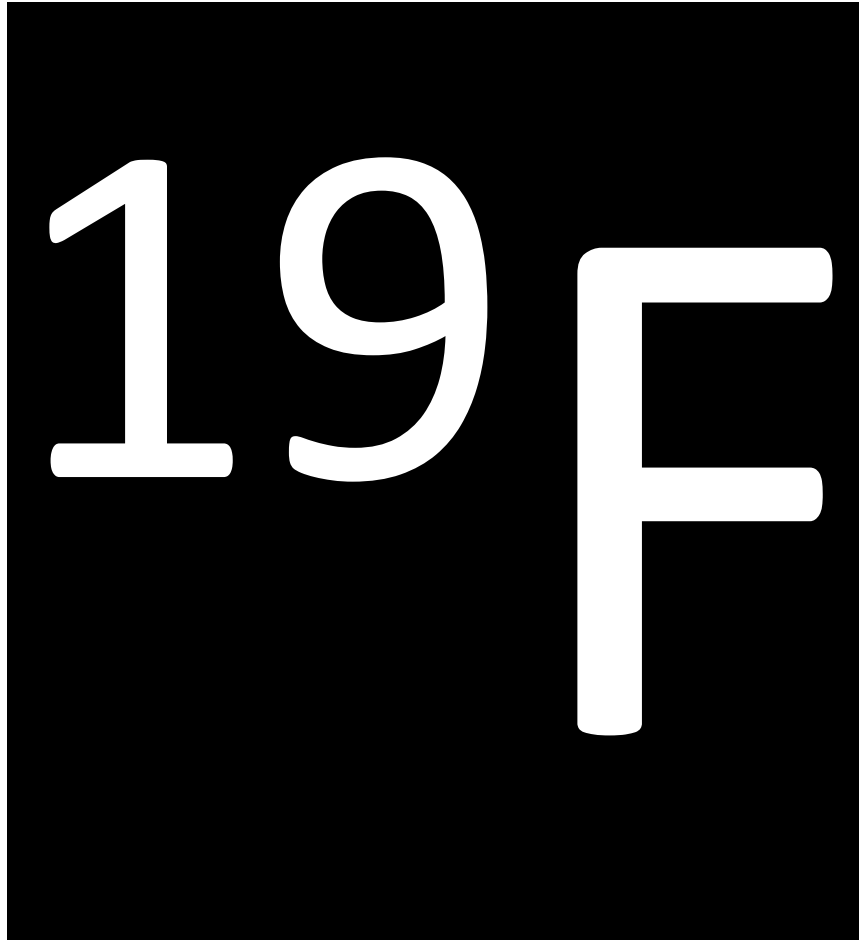
Half life: 110 min

Flip a coin until you get “heads”.

When you do so, undergo:



Congratulations, you have catalysed one cycle of hydrogen fusion: $4 \times ^1\text{H} \rightarrow ^4\text{He} + 2 \times \beta$. Continue from ^{15}O .



Fluorine-19 (Stable)

The stable isotope of fluorine, ^{19}F ,
is not produced during the
Hot-CNO cycle.

^{18}Ne

Neon-18 (β decay to ^{18}F)

Half life: 2 s

Wait 2 s and flip a coin (don't hang around). If you get "heads" you β decay to ^{18}F . If you get "tails", flip again after 2 s.

^{19}Ne

Neon-19 (β decay to ^{19}F)

Half life: 17 s

Congratulations, you've broken out
of the Hot-CNO cycle!

20Ne

Neon-20 (Stable)

Neon-20, one of the stable isotopes of neon is not produced during the Hot-CNO cycle.

^{21}Na

Sodium-21 (β decay to ^{21}Ne)

Congratulations, you've broken out
of the Hot-CNO cycle!