Nuclide Race: Rules

Aim of the Game

The task is to synthesize the target nuclide with the help of neutron capture, that is, to reach it with your game figure. Try to reach the goal in fewer steps than your opponent.

Game Rules

To advance nucleosynthesis, you must try to climb to the top right of the nuclide table. The neutron capture helps you to do this. However, neutron capture takes place only with a certain probability. Unstable nuclides can also decay before neutron capture occurs.
Both players start their first turn at the same time and have to follow the following procedure :

1. Calculate the probability ratio for the nuclide you are standing on (indicates how likely neutron capture is compared to the decay of the nuclide).
2. Take from the table which number each of you must roll for a neutron capture to succeed. The higher the probability ratio, the higher your chance of neutron capture.
3. Each of you now rolls the dice in turn to attempt a neutron capture.
   There are two possibilities:
   1. If your dice count is high enough, you can make the neutron capture move on the board and continue playing. Your turn continues, so you start again with step 1 on the new field.
   2. If your dice number is too low, the nuclide you are standing on will decay. So you have to move your piece according to the rules of nuclear decay:
      Beta-Minus, Double Beta-Minus, Beta-Plus, or Double Electron capture.
      With this, your turn ends. Your opponent may continue until he also has to make a nuclear decay. Only when you have both made a nuclear decay, you may re-enter the race.

The player who gets to the given goal in fewer moves wins the nuclide race. After each game, compare the paths you both took.

Probability Ratio p_n/λ	Required number for a Neutron capture
< 0,0001	Neutron Capture not possible
0,0001 – 0,009	6
0,001 - 0,09	5 or 6
0,1 - 99	4,5 or 6
100 – 9 999	3, 4, 5 or 6
10 000 – 100 000	2,3,4,5 or 6
> 100 000 or stable	1,2,3,4,5 or 6