

CNO Card Game

Instructions

The object of the game is to score the most points either in a single round or over a series of rounds. Points are scored by playing out cards representing the **CNO** cycle.

SETUP

Both players shuffle their decks. Each player counts out 15 cards face down. This becomes their HAND. The remaining cards become the STOCK. Four cards from the stock are laid out, face up, in front of each player. These four spots are the PLAY ROW. The top card of the stock is always visible, as is the top card of the hand.

PLAY

From their stock, play row, or from their hand, players play cards onto reaction piles in the center of the table. All players may play their cards onto any reaction pile unless the top card of the pile is Neon-20 (^{20}Ne)...see below.

Since the lowest element in the CNO cycle is Carbon-12 (^{12}C), ^{12}C is the only card that can be used to start a reaction pile.

The maximum number of reaction piles is 2X the number of players.

Players play cards onto the reaction piles so as to follow the chain of reactions in the CNO cycle. Each card in the k-12 set has one or more isotopes listed in the upper lefthand corner as an aid to indicate which cards it can be played on.

Players may play cards directly from their play row. That slot on the row is replaced by the top card of the stock, and the top card of the stock is flipped over.

Players may play cards from their hand by cycling through the cards in their hand one-by-one. Once a player has cycled through all of the cards in their hand, they can begin again at the start of their hand. This can be repeated any number of times.

Instructions, continued

At any time, a player may remove a Neon-20 card from the play row, the top of the stack, or from their hand. If they do remove a Neon-20 card, then that card doesn't count for or against the player (see SCORING below).

Once a Neon-20 card is placed on top of a reaction pile, no new cards may be played on that pile. The pile still counts as a reaction pile with respect to the maximum number of allowed piles (2X the number of players).

Whenever a player exhausts his/her stock, or empties his/her hand, that player may declare "Done". At that point, the round ends and the points are tallied. A player does not have to declare that they are done upon emptying the hand, and they may continue to play cards.

SCORING

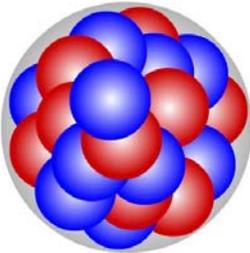
For each card played onto a reaction pile, the player who played it gets two (2) points. For each card remaining in his/her hand, play row, or stock, a player loses one (1) point. For each card in a reaction pile topped by a Neon-20 card, the player who played the Neon-20 card gets one (1) point. The player with the most points wins the game.

SPECIAL RULE

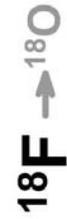
In the event that no player can make a legal play from the play row or hand, AND all players still have cards in their hands and stock, the top card of the stock and the cards in the play row are placed on the bottom of the stock, a new play row is laid out, and the new top card of the stock is turned face up. This process repeats as necessary. If no player can make a legal play from the play row or hand, but one or more players do not have cards remaining in either their hands or stock, the game ends.



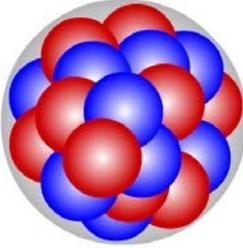
^{19}F



^{19}F is the only stable isotope of fluorine element.



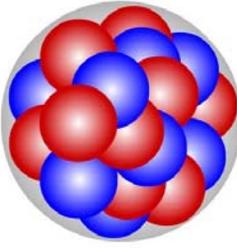
^{18}F



^{18}F is an unstable isotope, having a half-life of 110 minutes.



^{17}F



^{17}F is an unstable isotope of fluorine element.

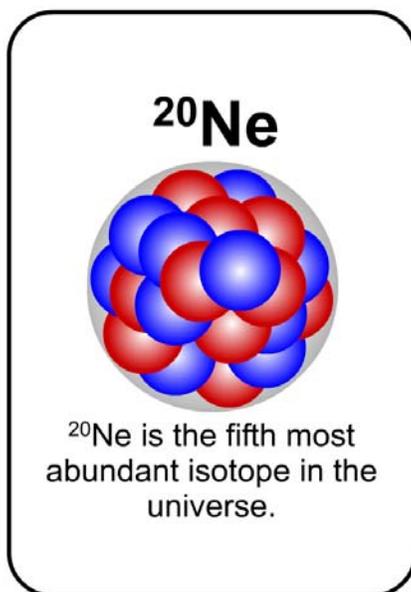


PRINT YOUR OWN SET OF CNO CARDS

Print three (3) of each of these cards.

Print only one of this card per deck.

^{20}Ne

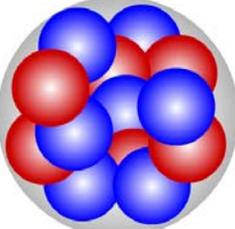


^{20}Ne

Print four (4) of each of these cards.



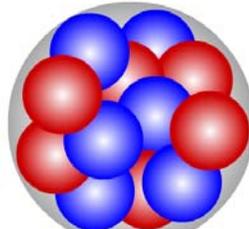
^{13}C



^{13}C is created from ^{12}C that is present in the initial gas of the stars.



^{12}C

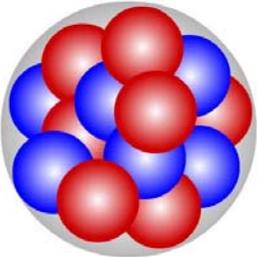


^{12}C is a stable isotope. It is the 4th most abundant nucleus in the universe.



$^{13}\text{N} \rightarrow ^{13}\text{C}$

^{13}N



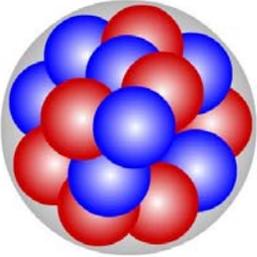
^{13}N is the lightest one among the three isotopes of nitrogen element.

$^{13}\text{N} \rightarrow ^{13}\text{C}$

Print four (4) of each of these cards per deck.

$^{14}\text{N} \rightarrow ^{15}\text{O}$

^{14}N

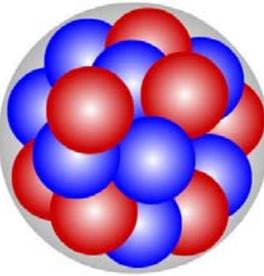


^{14}N is a stable, non-radioactive isotope of the nitrogen element.

$^{14}\text{N} \rightarrow ^{15}\text{O}$

$^{15}\text{N} \rightarrow ^{16}\text{O}$
 $^{15}\text{N} \rightarrow ^{12}\text{C}$

^{15}N

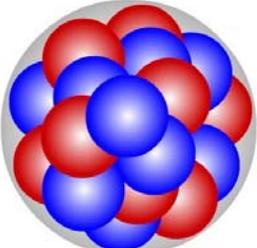


^{15}N is produced by the capture of a proton by the ^{14}N nuclei.

$^{15}\text{N} \rightarrow ^{16}\text{O}$
 $^{15}\text{N} \rightarrow ^{12}\text{C}$



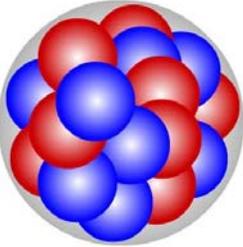
^{17}O



^{17}O is the least abundant of the three stable O isotopes.



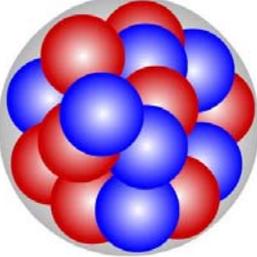
^{16}O



^{16}O is the third most abundant isotope in the universe.



^{15}O



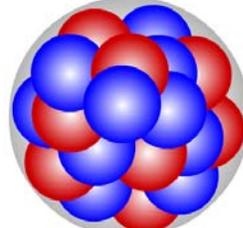
Oxygen is vital for sustaining life on Earth. ^{15}O is an unstable isotope.



Print four (4) of each of these cards per deck.



^{18}O



^{18}O is the second most abundant isotope in the universe.



Finally, choose one of the following colors for the back of your cards, and duplex print your personal deck of JINA Outreach CNO Cycle Cards.



