

Isotope Identity Cards

Isotope Name	Protons and Neutrons
Helium-3	2 p ⁺ 1 n
Helium-4	2 p ⁺ 2 n
Lithium-6	3 p ⁺ 3 n
Lithium-7	3 p ⁺ 4 n
Carbon-12	6 p ⁺ 6 n
Carbon-13	6 p ⁺ 7 n
Nitrogen-14	7 p ⁺ 7 n
Nitrogen-15	7 p ⁺ 8 n
Oxygen-16	8 p ⁺ 8 n
Oxygen-18	8 p ⁺ 10 n
Neon-20	10 p ⁺ 10 n
Neon-22	10 p ⁺ 12 n
Argon-36	18 p ⁺ 18 n
Argon-40	18 p ⁺ 22 n
Potassium-39	19 p ⁺ 20 n
Potassium-40	19 p ⁺ 21 n
Calcium-40	20 p ⁺ 20 n
Calcium-46	20 p ⁺ 26 n
Titanium-46	22 p ⁺ 24 n
Titanium-50	22 p ⁺ 28 n
Iron-54	26 p ⁺ 28 n
Iron-58	26 p ⁺ 32 n
Nickel-58	28 p ⁺ 30 n
Nickel-64	28 p ⁺ 36 n
Zinc-64	30 p ⁺ 34 n
Zinc-70	30 p ⁺ 40 n

It's a Match!

The Deck

The deck contains 52 cards, with two isotopes of thirteen different elements. Each isotope is depicted in two ways—by isotope name and by number of protons and neutrons. For example, copper-65 would have a corresponding card with 29 p⁺ (protons) and 36 n (neutrons).

The Deal

The first dealer is chosen randomly, and the turn to deal rotates clockwise if more than one round is played. The dealer shuffles the cards, then lays them face down on the playing surface in the following manner—three rows of eight cards and four rows of seven cards.

Object of the Game

The object of the game is to find as many pairs of cards depicting the same isotopes as possible, relying on memory. A pair consists of the isotope name and its corresponding number of protons and neutrons. Two different isotopes of the same element are not considered a match. For example, *copper-65* would match with 29 p⁺, 36 n, but would **not** match with *copper-63* or 29 p⁺, 34 n.

The Play

Two or more players can play. The player to the left of the dealer (clockwise) goes first.

1. One card is turned over by the player and left in place for all to see.
2. A second card is turned over by the player.
3. If the two upturned cards make an isotope pair, the player picks them up and keeps them. Each time a pair is made, the player gets another turn.
4. After everyone has seen the two upturned cards that do not make a pair, the player turns the cards face down in their original locations.
5. The play proceeds clockwise to the next player.
6. Once all the cards have been paired, the player with the most pairs is declared the winner.

Variation

- The dealer chooses the layout of the cards—circular, random, four rows of 13 cards, etc.

Hints

- Many atoms have the same mass number but are not isotopes of the same element. Examples include potassium-40 and argon-40 or iron-58 and nickel-58.
- Knowing the atomic number is key to identifying isotopes of the same element. Keep the handout of the periodic table at hand. All of the isotopes depicted on the cards are among the first 30 elements listed on the periodic table.

Got Isotopes?

The Deck

The deck contains 52 cards, with two isotopes of thirteen different elements. Each isotope is depicted in two ways—by isotope name and by number of protons and neutrons. For example, isotopes of copper would be represented by four cards, *copper-63*; *copper-65*; *29 p⁺, 34 n*; and *29 p⁺, 36 n*.

The Deal

The first dealer is chosen randomly, and the turn to deal rotates clockwise if more than one round is played. The dealer shuffles the cards, and then deals the cards to each player, starting to the dealer's left. For more than two players, five cards each are dealt. For two players, seven cards are dealt to each. The remaining cards are placed face down in a stockpile.

Object of the Game

The object is to collect “books” of cards. A book consists of four cards representing isotopes of the same element.

The Play

1. The player to the left of the dealer begins. He or she asks any one other player if he has any cards matching one of the isotopes in the player's hand. For example, on Mary's turn she asks Tom, “Tom, do you have any argon isotopes?” Mary must have at least one card depicting an isotope of argon in her hand in order to ask for any.
2. If the player who was asked has one or more cards depicting an isotope from the named element, he must give all his cards for that element to the player who asked for them. The player who asked then gets another turn. He or she may ask the same player for another element, or ask a different player for isotopes of the previously requested element or a different element.
3. If the player who was asked does not have any cards of the named element, he says, “No.” The player who asked then draws the top card from the stock pile. If that card is an isotope of the named element, the player shows it is a match, and draws another card. If the drawn card is not from the named element, the player's turn is over.
4. Play proceeds to the left (clockwise).
5. When a player has all four cards of the same element, the cards are considered a book, and are removed from the player's hand and set aside.
6. The game ends when a player is out of cards or when the last card is drawn from the stockpile. The winner is the player who then has the most books.

Variation

- Instead of the play proceeding clockwise, the player who says, “No,” gets the next turn.

Hints

- Many atoms have the same mass number but are not isotopes of the same element. Examples include potassium-40 and argon-40 or iron-58 and nickel-58.
- Knowing the atomic number is key to identifying isotopes of the same element. Keep the handout of the periodic table at hand. All of the isotopes depicted on the cards are among the first 30 elements listed on the periodic table.