

# Chemical Alias: An Engaging Way To Examine Nomenclature

Mikhail Kurushkin<sup>\*,†</sup> and Maria Mikhaylenko<sup>‡</sup>

<sup>†</sup>Common and Inorganic Chemistry and <sup>‡</sup>Physics and Nanotechnologies, Peter the Great St. Petersburg Polytechnic University, 29 Polytechnicheskaya Street, St. Petersburg, Russian Federation 195251

## Supporting Information

**ABSTRACT:** An educational card game, “Chemical Alias”, has been developed as an alternative method of reviewing students’ knowledge of nomenclature. In contrast to conventional tests, this highly competitive activity is a fun and effective way to examine and reinforce nomenclature. The students play in pairs, using Clark’s famous spiral arrangement of the elements as the board and cards with chemical formulas. One of the students names the chemical compounds and the other answers with their chemical formulas. The counters are moved through the elements according to the number of correct answers.

**KEYWORDS:** High School/Introductory Chemistry, First-Year Undergraduate/General, Inorganic Chemistry, Collaborative/Cooperative Learning, Humor/Puzzles/Games, Nomenclature/Units/Symbols



Educational games have been established as an increasingly popular way of learning in classroom.<sup>1</sup> As well as being engaging, these games also prove to be an effective educational tool. Games can be presented in a variety of forms. It is known that interactive learning can enhance skills such as critical thinking, problem solving, collaborative work, and many others.<sup>1–8</sup> Games allow educational process to be active and challenging, which gives students a better understanding of the topic.

Board games are widely used in classroom as they can present a hard topic in an interesting and approachable way. Several games used to teach and reinforce the knowledge of synthetic organic chemistry, carbohydrates, chemical formulas, nomenclature and periodic table, recognition of organic functional groups, categorizing chemical elements, or learning covalent and ionic compounds have been reported.<sup>1–7</sup>

According to “Nomenclature of Inorganic Chemistry” (IUPAC Recommendations 2005), chemical nomenclature is intended to unambiguously identify chemical species to facilitate communication in science and education.<sup>9</sup>

An educational game that helps to reinforce nomenclature is called “ChemOkey”.<sup>7</sup> Students are supposed to mix and match tiles with the names and symbols of cations and anions to create a set of chemical compounds. It is a competitive game where each student aims to get the highest score. “ChemOkey” is intended to improve students’ understanding of nomenclature and writing chemical formulas.

“Chemical Alias” is a new board game which is designed to examine knowledge of chemical nomenclature. This game for high school students and first-year undergraduates (15–18 years old) has proven to be an exciting and thought-provoking classroom experience (see “How Students React” section).

“Chemical Alias” comes from the original “Alias” board game where the point of the game is to explain words to each other without using the actual “hidden” word. It is played in pairs where each pair has a limited amount of time to guess as many words as possible, so the game is very competitive. The size and the difficulty of words may be varied as well as the size of the group playing, which makes it suitable for almost any level of knowledge or amount of people (for complete “Alias” rules see [Supporting Information](#)). All these rules apply to “Chemical Alias”, so the game is an example of active learning in classroom.

## ■ PREPARATION

Prior to the game the students organize the working space. A round table is preferable. The board is placed at the center of the table. Clark’s famous spiral arrangement of the elements (taken from Life Magazine May 16, 1949 issue, see [Supporting Information](#)) is suggested as the board due to resembling a race track and being visually attractive, though any similar representation of the elements is suitable. Clark’s original spiral arrangement of the elements is described in ref 10. Buttons of different colors are used as counters. The teacher divides the students into pairs. Each pair is given a counter and named accordingly (the red team, the blue team, etc.). All counters are placed on the board before the hydrogen (see Abstract Graphic). In case the number of students is odd, the teacher joins one of them and participates in the game.

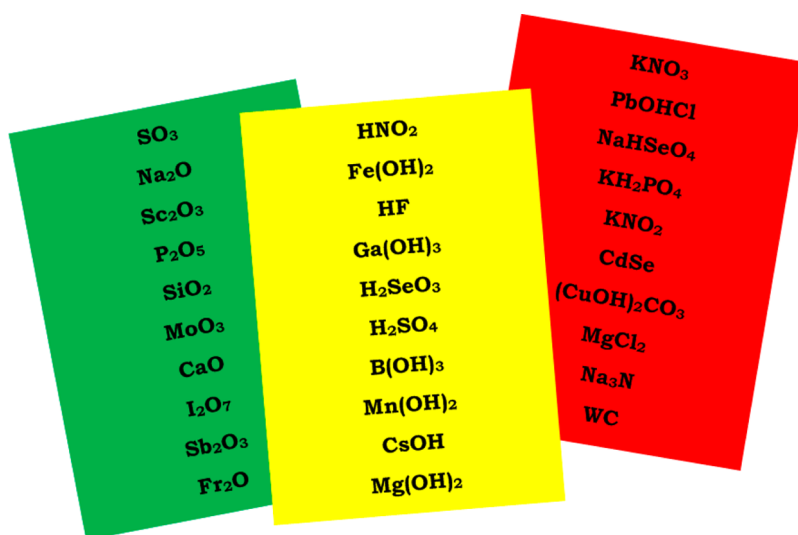


Figure 1. Examples of the game cards.

## GAME RULES

The game consists of three rounds. The first is for oxides, the second is for acids and bases, and the third is for salts. For each round, there is a deck of cards made by the teacher. A deck of cards consists of nine cards; 10 chemical formulas are written on each card (three decks of cards are provided in [Supporting Information](#)). For every round there is a colored deck of cards: green for the first round, yellow for the second round, and red for the third round (Figure 1).

The aim of the game for one teammate is to name the chemical compounds and for his partner to reply with the corresponding chemical formulas. Examples are given in Table 1.

Table 1. Examples of Correct Answers

Chemical Compound	Teammate 1	Teammate 2
CO	carbon monoxide	cee o
H <sub>2</sub> SO <sub>4</sub>	sulfuric acid	aitch two ess o four
NH <sub>3</sub>	ammonia	en aitch three
NaHCO <sub>3</sub>	sodium bicarbonate (soda) <sup>a</sup>	en a aitch cee o three

<sup>a</sup>The teacher might consider accepting trivial names.

The teams take turns clockwise. During a round, each team has 1 min to give as many correct answers as possible. A timer is used by the teacher. Used cards are put to the bottom of the deck. The teacher verifies the correctness of all responses, marking right answers in a scoring sheet (Table 2):

After the round, the teacher counts the number of correct answers for every team, and the counters are moved forward through the elements accordingly. Each round the students exchange their roles in the team.

Table 2. Scoring Sheet for Chemical Alias

Round	Red Team <sup>a</sup>	Blue Team
First	+++++++ (9)	+++++ (6)
Second	+++++ (6)	+++++ (5)
Third	+++++ (5)	+++ (3)

<sup>a</sup>If the teacher is part of a team, the points are divided by two.

After the last round, the team that has reached further through the elements on the board wins. Alternatively, one of the elements could be chosen by the teacher as the destination point. When any team reaches such element, the game is finished. A typical game for 10 students takes 20 min.

“Chemical Alias” can be customized by the teacher. If there is a large number of students in class (14 and more), students can be split into two or more groups with several games going on in a classroom simultaneously. The teacher can assign students to be score keepers in other groups. Score keepers should be provided with the answer keys (for the answer keys see [Supporting Information](#)). The number of rounds and hence the decks can be more than three. For example, acids and bases can be separate decks of cards, etc.

## EDUCATIONAL GOALS

Among other educational games, “Chemical Alias” accomplishes goals such as examining the knowledge of chemical nomenclature, engaging students in learning process and working in teams. Furthermore, there are aspects of our game, which stand out in comparison to the others.

First and foremost, throughout the game students repeatedly hear right answers. This enhances understanding of the nomenclature and reinforces mechanical memorization.

Another advantage to “Chemical Alias” is that it has no limit to number of students participating. Virtually a whole class can play the game at the same time, which is not the case in other games such as “ChemOkey”, “Families of Chemical Elements Game” or “Go Chemistry”. Besides, “Chemical Alias” is played in pairs as opposed to nomenclature games stated above, which is an obvious advantage because working in pairs is a team building exercise that also makes the game more competitive.

Above that, “Families of Chemical Elements Game” is extremely time-consuming, because students have to make their own deck of cards. “Go Chemistry” is complicated, as stated by the authors, it takes much time for students to understand the game.

“Chemical Alias” manages to avoid all of the disadvantages stated above, yet completes the same educational goals effectively.

## ■ HOW STUDENTS REACT

After the game, the students were asked to complete a questionnaire:

- Did you like “Chemical Alias” and why?
- Did this game help you to reinforce chemical nomenclature?
- Did you find “Chemical Alias” enthralling?

The students’ feedback was positive:

- (1) The game clearly shows an algorithm that is used to form compounds such as oxides, hydroxides etc. So not only does it reinforce the knowledge, but it really gives a better understanding of the topic;
- (2) It is an effective practice, which facilitates memorization of chemical formulas of the compounds;
- (3) Due to the limited amount of time per pair, students get the feeling of excitement and competitiveness which makes one think quicker.

The students even gathered after classes to play the game.

## ■ ASSOCIATED CONTENT

### § Supporting Information

The Supporting Information is available on the [ACS Publications website](https://pubs.acs.org) at DOI: [10.1021/acs.jchemed.5b00244](https://doi.org/10.1021/acs.jchemed.5b00244).

Round 1 (green) card images ([PDF](#), [DOCX](#))  
 Round 21 (yellow) card images ([PDF](#), [DOCX](#))  
 Round 3 (red) card images ([PDF](#), [DOCX](#))  
 Round 1 (green) answer key to card images ([PDF](#), [DOCX](#))  
 Round 2 (yellow) answer key to card images ([PDF](#), [DOCX](#))  
 Round 3 (red) answer key to card images ([PDF](#), [DOCX](#))  
 File containing an external link to “Alias” board game complete rules and information regarding purchasing Clark’s spiral periodic table ([PDF](#), [DOCX](#))

## ■ AUTHOR INFORMATION

### Corresponding Author

\*E-mail: [mkurushkin@spbstu.ru](mailto:mkurushkin@spbstu.ru).

### Notes

The authors declare no competing financial interest.

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