

Rules of the Organic Chemistry Game

Premise: You and your fellow players are brilliant but unscrupulous students performing thesis research in the lab of an eminent synthetic organic chemist. Unfortunately he is a bit eccentric, and has decided that the first student to finish his or her thesis research will be the only one of you who graduates...

Equipment: The game uses two decks. The larger cards are Project cards, each of which is marked with a synthesis problem. The smaller cards are Reagent Cards. There are two types of Reagent Cards: Reaction Cards (marked in the upper left-hand corner with a flask) and Nefarious Cards (marked with a cat.) To make the decks, download the master sheets from the course website. You can print the Project Cards on ordinary printer paper, but you will need to have the Copy Center or Kinko's print the Reagent Cards on 110# cardstock.

Order of Play:

The Organic Chemistry Game works best with 3-5 players. The dealer starts the game by shuffling the decks and dealing each player two Project Cards. The players should then spend some time solving the problems on their Project Cards. (You can work together, if you wish. Remember that it's good to know what reagents your opponents will need in order to complete their syntheses!)

Once all of the synthesis problems are solved, put a penny on the starting material of each of your syntheses. (The penny serves as a marker to show what stage of the synthesis you're at.)

The dealer then deals five Reagent Cards to each player, and puts the rest of the deck face down. (The deck is called the "stockroom.") Play starts at the left of the dealer and proceeds clockwise.

Start your turn by taking one card from the stockroom. You may then play one Reaction Card and/or one Nefarious Card during your turn. When you play a card, show it to the other players, announce what the card is, (i.e. "I'm doing hydroboration,") and put the card in the discard pile (also known as the "waste bottle.") At any time during your turn you can offer to trade cards with other players.

Remember that you have to play the Reaction Cards in order. In other words, you can only play a Reaction Card if your synthesis is at a step which uses that reaction. Once you play the card, move the penny forward to the next step in your synthesis. The first player to move the pennies to the end of both of his or her syntheses wins.

Notes on some of the cards:

- The H₂O Nefarious Card will only destroy reagents which do not contain water. If the card you pick from your opponent's hand explicitly states that H₂O, H₃O⁺, or OH⁻ is involved in the reaction, you have to give it back to them. And, you don't get to try to draw a second card from their hand.

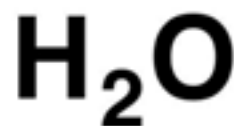
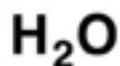
- Coupling reactions: When you use a card with a coupling reaction (such as the Grignard reagent, or NaNH₂,) you don't need a second card for the molecule that you're coupling to. For example, if your synthesis starts with an alkyne and you need to add on a methyl group, all you have to do is play the NaNH₂ card. You do not need a second card for methyl bromide or methyl iodide. Remember that you can also perform acetylide anion alkylation if you have a bromide or iodide and want to couple it to ethyne, propyne, or some other simple alkyne; you don't need a second card for the acetylene.

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(liq.)

Freeze the lock off the stockroom door and draw three cards.



(contamination of dry reagents)

Take a random card from your opponent's hand and put it in the waste bottle.

Does not apply to reagents which already contain water.



(liq.)

Freeze the lock off the stockroom door and draw three cards.



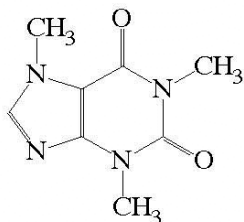
One of your labmates is injured in a mysterious fire, and must lose a turn while recuperating.

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Caffeine



Caffeine

Play 2 reaction cards during this turn

H_2SO_4



H_2SO_4

Opponent's product is destroyed, and he/she must restart synthesis from starting materials.

$CHCl_3$



$CHCl_3$

chloroform

Peek at an opponent's hand and steal a card.

$CHCl_3$



$CHCl_3$

chloroform

Peek at an opponent's hand and steal a card.

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(liq.)

Freeze the lock off the stockroom door and draw three cards.



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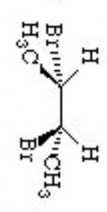
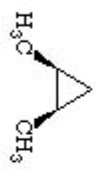
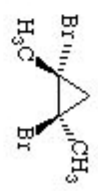
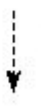
chloroform

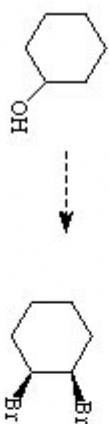
Peek at an opponent's hand and steal a card.



One of your labmates is injured in a mysterious fire, and must lose a turn while recuperating.







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<p>Li NH₃</p> <p>Li → NH₃</p>	<p>Br₂ → CCl₄</p> <p>Br₂ → CCl₄</p>
<p>KOH</p> <p>KOH</p>	<p>BH₃</p> <p>1.) BH₃ → 2.) HOOH, OH⁻</p> <p>Hydroboration</p> <p>(may be used on either alkenes or alkynes)</p>

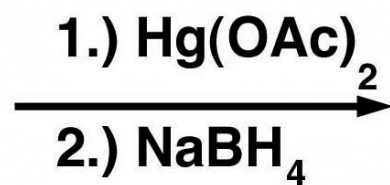
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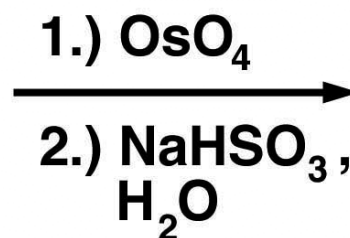
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<p>H_2/cat</p> <p>H_2 → Pd</p>	<p>$NaNH_2$</p> <p>$NaNH_2$</p> <p>(can be used for elimination or for acetylide anion alkylation)</p>
<p>H_2/cat</p> <p>H_2 → Lindlar</p>	<p>HX</p> <p>HX → Ether</p>

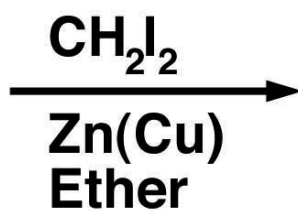
Oxymercuration



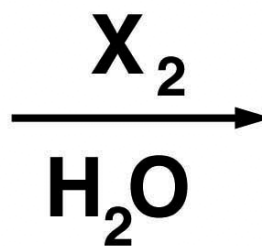
OsO₄



Simmons-Smith



Halohydrin formation

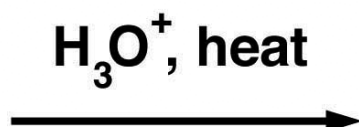


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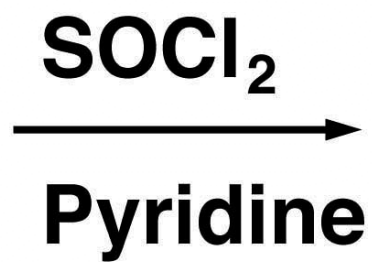
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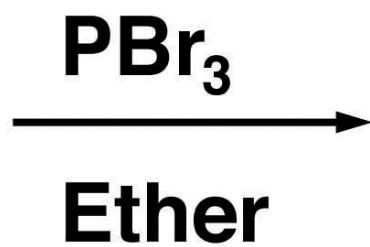
Dehydration
of alcohols



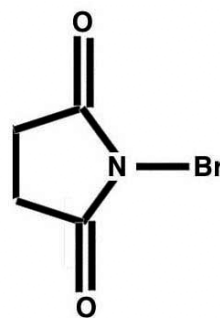
SOCl_2



PBr_3



NBS



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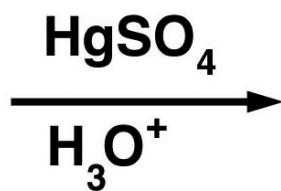
Grignard
Reagent



Gilman
Reagent



Oxymercuration



Nucleophilic
Substitution

