

Retro Synthesis

The Official rules of play

Components

- 1 foldable tile board
- 40 material cards
- 10 environment cards
- 10 bonus cards
- 15 Sabotage cards
- 80 blocks in 4 colours



Note: You may need a pen and paper to track score

Goal

Uh oh! There's absolute CHAOS in pixel labs! You need to **place your materials with smart chemical bonds to build a bridge between two benzenes** and escape! Use your chemical knowledge to build the **most stable** route and **race to the end!** Careful though! If you're reckless and let your molecule get too unstable, it'll be disaster!

Learning intentions

One of the first things any undergraduate chemist needs to learn is how and why bonds form and become stable. This game encourages them to think about which compounds like to bond to each other for the goal of **increased stability**. Through this game, students will have to think and engage in **stability chemistry** by making their own compound.

Teacher tip: Before playing the game, we recommend discussing the bonding patterns of the following basic groups: Metals, Organometals, Ions, Nonmetals and functional groups

Ideal play

This game is designed for 4-8 players split into teams of two, each with a basic undergraduate understanding of chemistry. It will take approximately 25 minutes to complete a round of the game followed by teacher discussion afterwards.

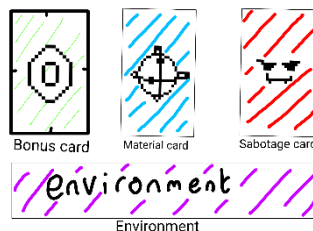
Teacher tip: Due to the short playtime, we recommend letting them play a round, discussing where they went right and wrong, then let them play again with their new knowledge and experience.

Set-Up

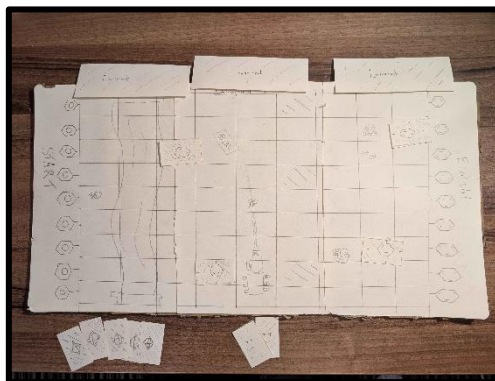
1. Lay the board out and shuffle the decks of cards, keeping the different categories separate
2. Place the **bonus cards face down** on the board. You can place them on the shaded tiles or spread them out as you see fit.

3. Place the top 3 environment cards of the deck **face down** along the board in the allotted sections.

4. Deal each player **7 material cards, 2 sabotage cards**. Players then **discard** the two material cards. Shuffle those back into the pile.



5. You're ready to begin! Your board should look something like this



Sectors

There are 9 rows between the start and the end of the board, each with 9 columns. Every 3 rows are a **sector**. This is important for **environments** and **charge**.

What's in a turn?

During your turn, you can choose to do one of two things.

1. **Place a material card** that connects to one you've already played (More on this in the card types section) and place your coloured block on it to denote it as your own.
2. **Draw 3 material cards and 1 sabotage**, then, discard two cards out of them.

Card types

Materials

Material cards are the compounds you have access to. Each one represents a compound real chemists work with. On the card, there is five points of information:

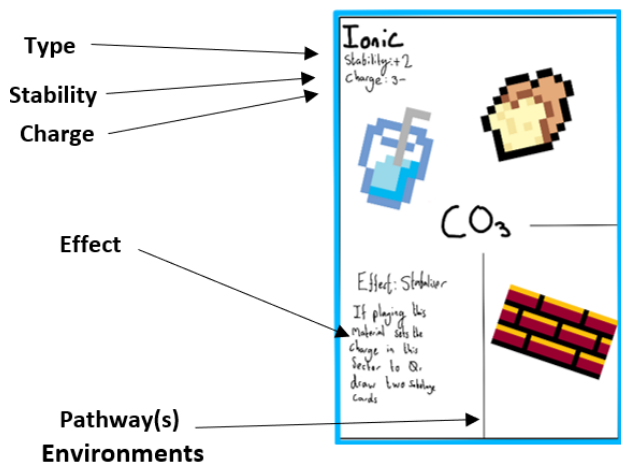
Material type – This is how chemists generally define elements. Each of the five types have general strengths and weaknesses.

Stability – This is how stable your molecular bridge is, and where you'll win or lose! At the end of the game, you'll tally up the stability across your entire bridge. Generally, better pathways or effects on a material will come at the cost of stability.

Charge – The elementary charge of the molecule. When tallying scores at the end, you gain points if the **total charge** per **sector** is **+1, 0, or -1**, then lose points if it's anything outside of that range.

Effect – Some materials do extra effects upon being placed. Read the card's effect and act accordingly.

Pathways – This shows how you can connect the material cards. You may only place cards that connect. (E.g a connection point at the top of one card leading into a connection point at the bottom of another)



Environments

Environments affect the formations of compounds. **After** a player places the first material card in a new **sector**, they flip over the environment card. This card will add a new rule to that sector that must be obeyed when placing **materials** or tallying **stability**

Bonus

Sometimes the most direct route isn't the best. **Bonus cards** are scattered around the board. They are represented by benzene, a stable molecule that can bond from all sides. If you place a **material** that connects a **pathway** to this tile, you can flip it over and claim it's reward. When placing your next tile, you may treat the bonus tile as your own and play a pathway from any side.



Sabotage

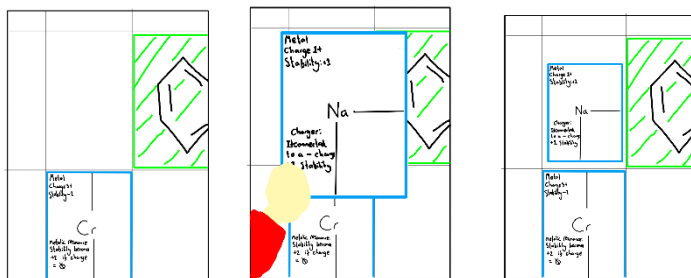
Ack! Sabotage! You can play a sabotage card at any time to hinder an opponent that's still in the game. They have effects that will change opponent's stability, charge or even force them to change their turn entirely.



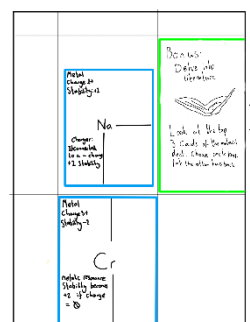
An example turn

Team Carbon and Team Oxygen are playing against each other. It's team Carbon's turn.

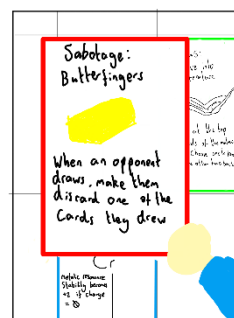
Seeing they can reach a **Bonus tile**, they play a sodium **material card**



Since they played a **material card** connecting to a **bonus tile** they get to flip it over. It lets them look at the top three cards of the library and choose one to keep, so they do that.



Oh no! It looks like team Oxygen have played a sabotage card. Because of what the card says, they must discard any cards they drew.



Team Carbon must discard the card they just drew due to the sabotage, but they progressed their molecule and added stability! The turn now passes to the next player

Ending the game

Once one player reaches and connects to the end with **one uninterrupted bridge**, the game ends after each other player takes two more turns to try and reach the end. During these turns, **they may place two materials instead of one**. After this, the game is over and Stability will be tallied.

Tallying score

The final score is comprised of the following elements:

Placement - 1st to the end gets **15** points. 2nd gets **10** points. 3rd gets **5** points

Bridge – Tally up the stability on all materials you successfully placed. Add them to your score.

Sectors – For each **sector**, calculate your overall **charge**. **+4 points** for each **-1, 0, +1**, **-4 points** for anything else

Connections - **-1 point** for every pathway that's not connected to a material.



Winning

At the end of the game, the player with the most points is the winner, and gets to choose the chemical name for the chain they created!

Note for teachers: Examine the winning students' chains. Perhaps there will be some interesting ones you can use as an example to discuss what does/doesn't work about it.

FAQS

Can I connect to another player's bridge?

Yes, but only if you are also playing a tile connecting to your own and move off their bridge with your next move. By doing this, you can't count their tiles during scoring.

Do the material's types have any additional rules?

No. The types are meant to group together materials that do similar things. You'll see trends between the scoring and effects of similar types and better understand their purpose in actual chemistry.

When can't we play sabotages?

*You **can't** play sabotages after you've reached the end and during point tallying*

If we win, can we name the compound "compound McCompoundface"?

Sure.

Retro
Synthesis

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