

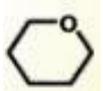
# E! Canasta



# Set Up

81 cards

- 4 suits (Glycolysis, Krebs, Acetyl-CoA, ETC)
- Special effect cards
- Joker



⬡ PYR

Pyruvate

CC(=O)C(=O)O

Pyruvate

⬡ PYR

⚡ ACOA

Acetyl Coenzyme A

CC(=O)SCoA

Acetyl Coenzyme A

ACO A ⚡

↻ FUM

Fumarate

OC(=O)/C=C/C(=O)O

Fumarate

FUM ↻

⚡ CII

Succinate dehydrogenase

Succinato Fumarato + 2 H<sup>+</sup>

Succinate dehydrogenase

CII ⚡

⚡ NADH

Nicotinamide adenosine dinucleotide

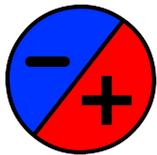
NC1=NC=NC2=C1N=CN2[C@@H]3O[C@H](COP(=O)(O)OP(=O)(O)OP(=O)(O)OP(=O)(O)OP(=O)(O)O)[C@@H](O)[C@H](O)[C@H]3O

Nicotinamide adenosine dinucleotide

NADH ⚡

E!nergizing

E!nergizing



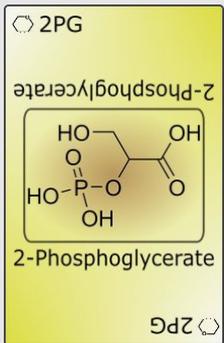
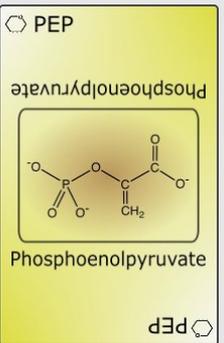
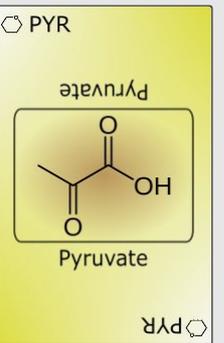
Indicator of positive or negative effect of a card upon another (look up chart)

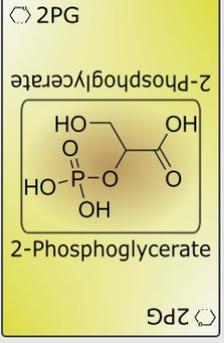
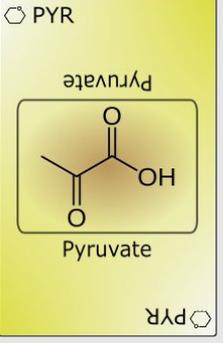
# Playing

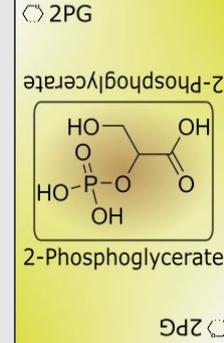
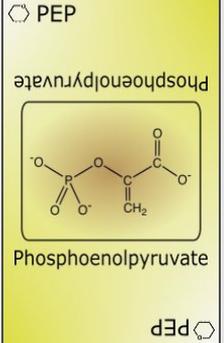
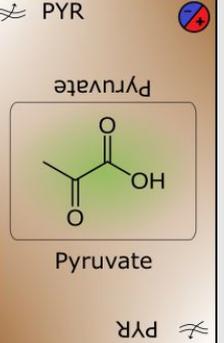
- 1** – Set teams and organize yourselves between 4 to 6 players, with each duo sitting on opposing sides;
- 2** – Shuffle cards;
- 3** – Allow the player to the right to cut the deck (No more than 2 times);
- 4** – Distribute 10 cards for each player in a clockwise fashion;
- 5** – Wait for a few minutes until all players get their own cards arranged;
- 6** – Start the game from whoever first received the cards and carry on clockwise;

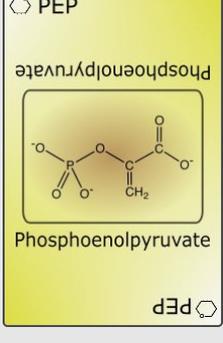
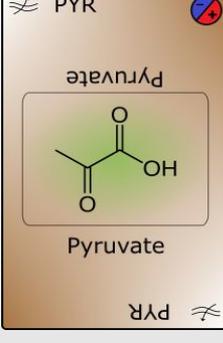
# Playing

7 - A player may meld organized sequences of, at least, 3 cards (cards of special effect do not apply to meld the first set). **The canasta may be natural (with a single suit), mixed or dirty (with a card from another suit that may be used as part of the set or using a joker, respectively).**

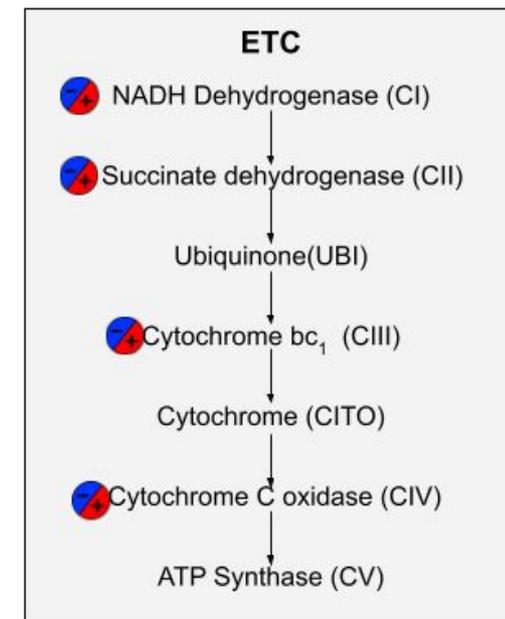
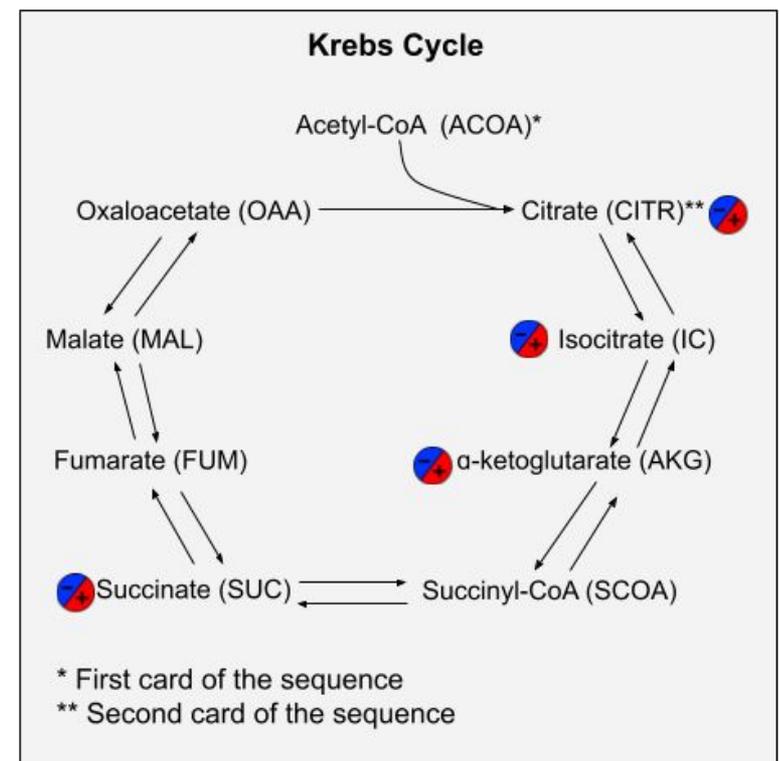
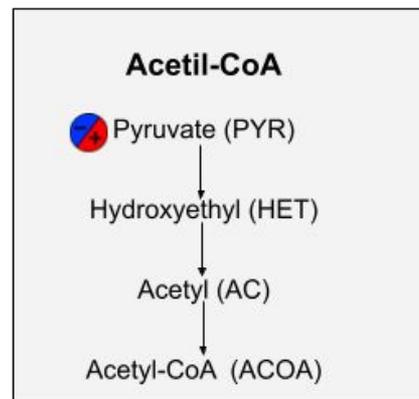
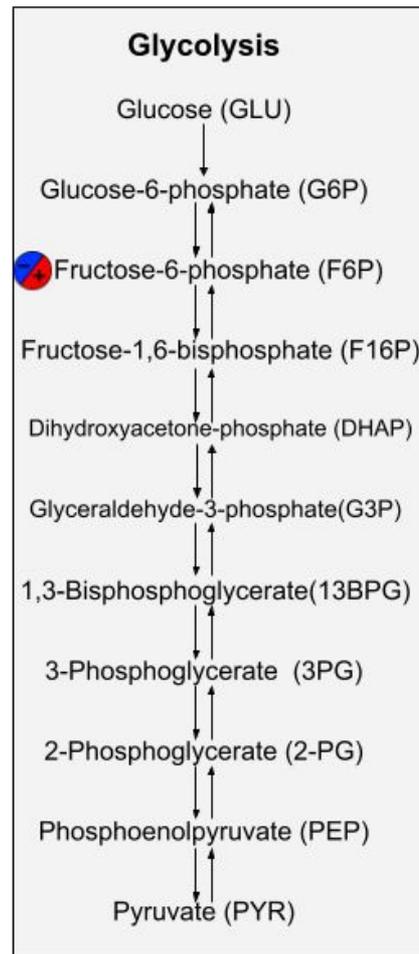
 <p>2PG 2-Phosphoglycerate</p>	 <p>PEP Phosphoenolpyruvate</p>	 <p>PYR Pyruvate</p>
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 <p>2PG 2-Phosphoglycerate</p>	 <p>Energizing</p>	 <p>PYR Pyruvate</p>
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 <p>2PG 2-Phosphoglycerate</p>	 <p>PEP Phosphoenolpyruvate</p>	 <p>PYR Pyruvate</p>
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 <p>Energizing</p>	 <p>PEP Phosphoenolpyruvate</p>	 <p>PYR Pyruvate</p>
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# Canasta Sequences



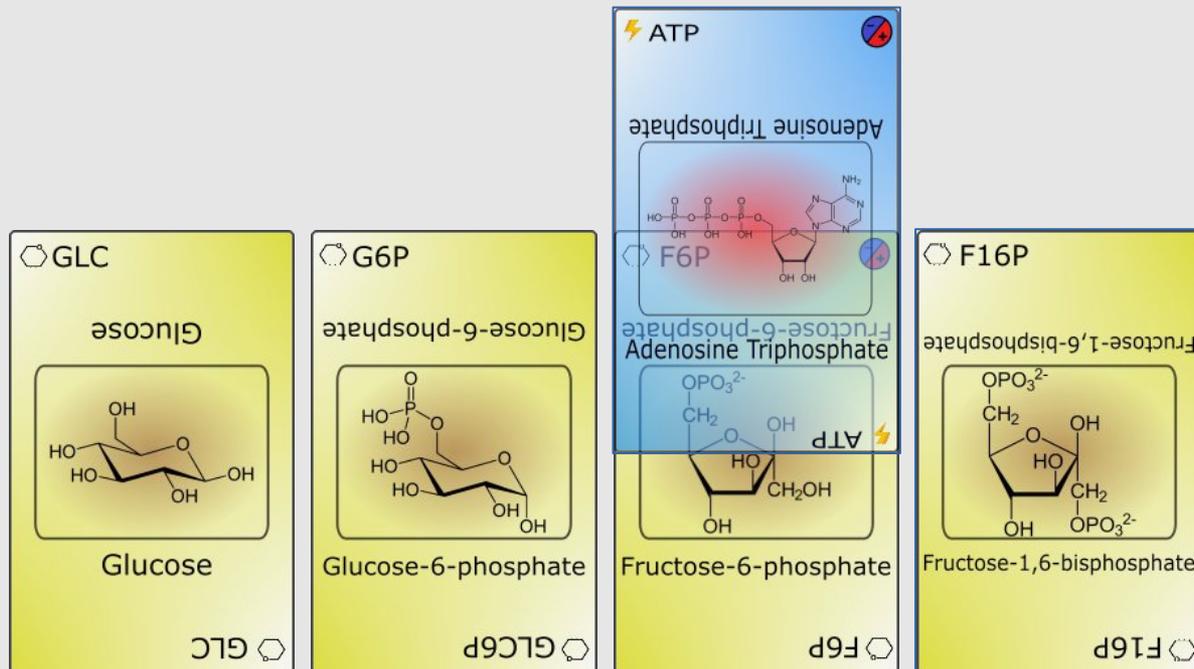
 Point of regulation/inhibition: look up chart of interactions for which cards may be used and the effects (+ or -).

# Playing

**8** – A player may use cards of special effect or any other that has an effect over their own sequences. Such cards  may only start getting used if at least one of the duo has put down a meld of no less than three cards;

**9** – If a player uses a special effect card incorrectly, the card is discarded and the player loses 50 points;

In this example, upon playing the ATP card over the opposing duo's F6P, a negative effect occurred over the canasta and the player who owns the meld must write down his score loss: **-50 (ATP)**



# Example of Scoring + a special effect card

CI

NADH dehydrogenase

NADH  $\rightarrow$  NAD<sup>+</sup> + H<sup>+</sup>

4 H<sup>+</sup> 2 H<sup>+</sup>

CI

CII

Succinate dehydrogenase

Succinato  $\rightarrow$  Fumarato + 2 H<sup>+</sup>

2 H<sup>+</sup>

CII

UBI

Ubiquinone

UQ

UBI

CIII

Cytochrome b<sub>c</sub>

Complex III

CIII

CITO

Cytochrome

Cyt c

CITO

CIV

Cytochrome C oxidase

4 H<sup>+</sup> + O<sub>2</sub>  $\rightarrow$  2 H<sub>2</sub>O + 4 H<sup>+</sup>

CIV

ADP

Adenosine diphosphate

ADP  $\rightarrow$  ATP + H<sub>2</sub>O

CV

# Example of zeroed canasta with a special effect card

CI

NADH dehydrogenase

NADH  $\rightarrow$  NAD<sup>+</sup> + H<sup>+</sup>

4 H<sup>+</sup> 2 H<sup>+</sup>

CI

CII

Succinate dehydrogenase

Succinato  $\rightarrow$  Fumarato + 2 H<sup>+</sup>

2 H<sup>+</sup>

CII

UBI

Ubiquinone

UQ

UBI

CIII

Cytochrome b<sub>c</sub>

Complex III

CIII

CITO

Cytochrome

Cyt c

CITO

CN

Cyanide

CN<sup>-</sup>

4 H<sup>+</sup> + O<sub>2</sub>  $\rightarrow$  2 H<sub>2</sub>O + 4 H<sup>+</sup>

CIV

CV

ATP Synthase

ADP  $\rightarrow$  ATP + H<sub>2</sub>O

CV

# Table of interactions

Card	Biochemical Context	Effects in-game - upon the indicated card			
		Positives		Negatives	
2,4-DNP	Decoupler	--	--	Any card from the ETC	-50
Acetyl-CoA	Pyruvate dehydrogenase complex	---	---	Pyruvate (Acetyl-CoA suit)	-20
ADP	Used by enzymes that synthesize ATP, which can work as a modulator of isocitrate dehydrogenase	1-3-Bisphosphoglycerate Phosphoenolpyruvate Isocitrate ATP-synthase	+20	---	---
Antimycin A	Acts upon complex III	---	---	Complex III	zeroes
ATP	Participates in phosphorylation reactions and may work as a negative modulator.	---	---	Fructose 6-phosphate $\alpha$ -Ketoglutarate Complex IV	-50

⋮

see more in the rulebook

# Points table

Points Earned					
Canastas			Special Effect Cards		Going Out
Natural					
Dirty					
Mixed					
Royal					
Unfinished					

Lost Points					
Time (-10 after 1 min)			Special Effect Cards		Wrong Moves (-10 per card)

# Playing

**10** – If a player makes a meld of an incorrect sequence, they lose 10 points per card laid out wrong, in which they must return to his hand;

**11** – If a player does not have a meld to put down or does not wish to do so, they must take a card from the stock or take the first card from the discard pile e discard themselves one card, finishing their turn. (Whenever a card is taken, one must be discarded).

**12** – When played in duos, both players may add to their shared sets or play special effect cards that may apply both to their own game or their opponents, although following the turns sequence;

**13** – A player may join or split sets of cards however they wish. For example, they may split the canasta in two sets to separate a card of negative effect, as long as each set has at least 3 cards;

# Playing

**14** – If the stock is depleted, the cards from the discard pile must be reshuffled to make up a new stock;

**15** – The game may end in two ways:

I – When either of the players play all of their cards, leaving none in their hands (Going Out, bonus of 100 point to whoever goes out);

II – When there are no more cards to be taken from the stock and none of the players can make any moves (in such case, no points are awarded).

**16** – As the game ends, players must compute their points, paying attention to special effect cards (negative or positive), which can be checked on the sheet of card interactions, sequences and scoring.

# Scoring

Canasta	Scoring
<b>Natural Canasta</b> (full set of the suit)	Glycolysis: 400 points; Krebs Cycle: 300; Acetyl-CoA synthesis: 100 points; ETC: 200
<b>Royal Canasta</b> (natural canasta + substance that precedes or succeeds the pathway):	Score of a natural canasta + 50 points per card chained.
<b>Dirty Canasta</b> (full pathway with a joker or card from another suit)	Glycolysis: 200 points; Krebs Cycle: 150; Acetyl-CoA synthesis: 75 points; ETC: 100
<b>Mixed Canasta/Unfinished</b> (only part of a pathway, with at least 3 cards, which may be part of the same suit or be a sequence between suits.	3 cards: 50 points; 4 cards 75 points; 5 cards or more 100
<b>Going Out</b> (the first player going out)	100 points

# Scoring - Natural Canasta

CI

NADH dehydrogenase

NADH dehydrogenase

CI

CII

Succinate dehydrogenase

Succinate dehydrogenase

CII

UBI

Ubiquinone

Ubiquinone

UBI

CIII

Cytochrome b<sub>6</sub>

Cytochrome b<sub>6</sub>

CIII

CITO

Cytochrome

Cytochrome

CITO

CIV

Cytochrome C oxidase

Cytochrome C oxidase

CIV

CV

ATP Synthase

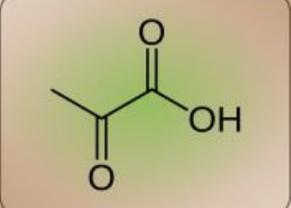
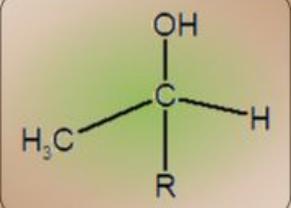
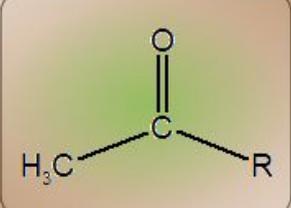
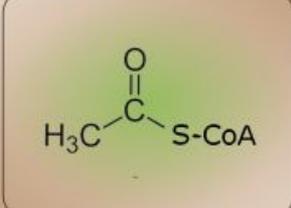
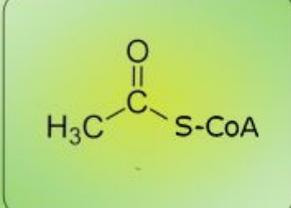
ATP Synthase

CV

<p><del>PYR</del></p> <p>Pyruvate</p> <p>Pyruvate</p> <p><del>PYR</del></p>	<p><del>HET</del></p> <p>Hydroxyethyl</p> <p>Hydroxyethyl</p> <p><del>HET</del></p>	<p><del>AC</del></p> <p>Acetyl</p> <p>Acetyl</p> <p><del>AC</del></p>	<p><del>ACOA</del></p> <p>Acetyl Coenzyme A</p> <p>Acetyl Coenzyme A</p> <p><del>ACOA</del></p>
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**Glycolysis: 400 points; Krebs Cycle: 300; Acetyl-CoA synthesis: 100 points; ETC: 200.**

# Scoring - Royal Canasta

<p><del>≠</del> PYR </p> <p>Pyruvate</p>  <p>Pyruvate</p> <p>PYR <del>≠</del></p>	<p><del>≠</del> HET</p> <p>Hydroxyethyl</p>  <p>Hydroxyethyl</p> <p>HET <del>≠</del></p>	<p><del>≠</del> AC</p> <p>Acetyl</p>  <p>Acetyl</p> <p>AC <del>≠</del></p>	<p><del>≠</del> ACOA </p> <p>Acetyl Coenzyme A</p>  <p>Acetyl Coenzyme A</p> <p>ACOA <del>≠</del></p>	<p> ACOA</p> <p>Acetyl Coenzyme A</p>  <p>Acetyl Coenzyme A</p> <p> ACOA</p>
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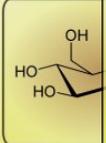
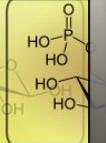
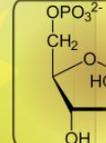
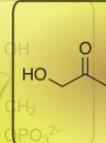
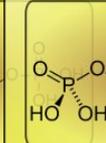
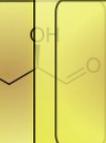
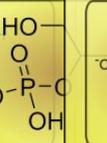
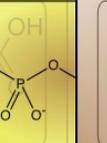
## Natural Canasta:

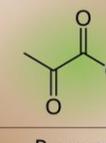
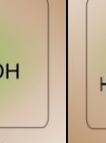
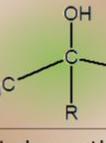
**Glycolysis:** 400 points; **Krebs Cycle:** 300; **Acetyl-CoA synthesis:** 100 points; **ETC:** 200.

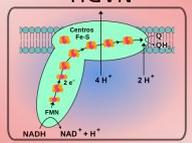
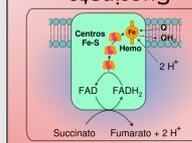
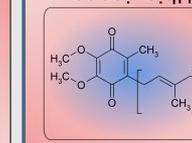
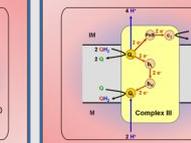
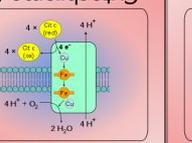
## Royal Canasta:

Points from the Natural Canasta + 50 points for each chained card

# Scoring - Dirty Canasta

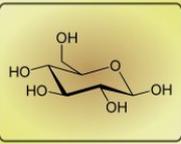
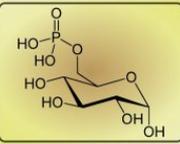
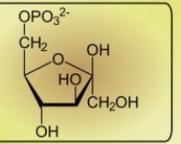
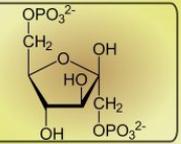
GLC Glucose 	G6P Glucose-6-phosphate 	<b>Energizing</b> 	F16P Fructose-1,6-bisphosphate 	DHAP Dihydroxyacetone phosphate 	G3P Glyceraldehyde-3-phosphate 	13BPG 1,3-Bisphosphoglycerate 	3PG 3-Phosphoglycerate 	2PG 2-Phosphoglycerate 	PEP Phosphoenolpyruvate 	PYR Pyruvate 
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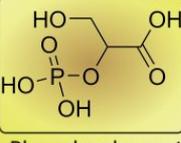
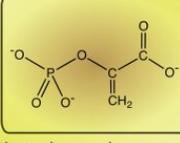
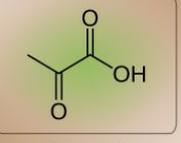
PYR Pyruvate 	HET Hydroxyethyl 	<b>Energizing</b> 	ACO Acetyl Coenzyme A 
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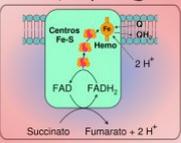
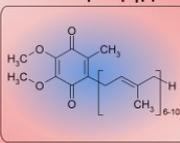
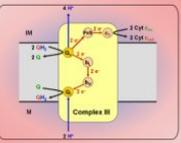
CI NADH dehydrogenase 	CII Succinate dehydrogenase 	UBI Ubiquinone 	CIII Cytochrome bc <sub>1</sub> 	<b>Energizing</b> 	CIV Cytochrome C oxidase 	CV ATP Synthase 
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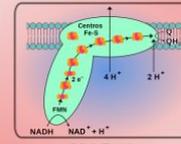
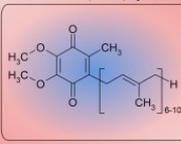
**Glycolysis: 200 points; Krebs Cycle: 150; Acetyl-CoA Synthesis: 50 points; ETC: 100**

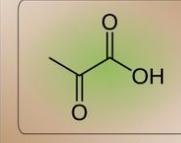
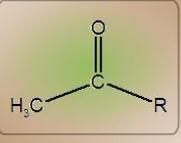
# Scoring - Mixed Canasta

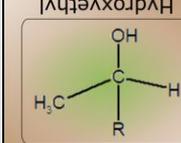
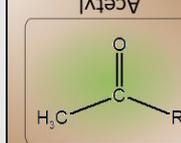
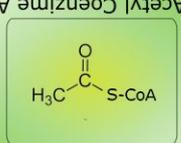
<p>GLC</p> <p>Glucose</p>  <p>Glucose</p> <p>GLC</p>	<p>G6P</p> <p>Glucose-6-phosphate</p>  <p>Glucose-6-phosphate</p> <p>G6P</p>	<p>F6P</p> <p>Fructose-6-phosphate</p>  <p>Fructose-6-phosphate</p> <p>F6P</p>	<p>F16P</p> <p>Fructose-1,6-bisphosphate</p>  <p>Fructose-1,6-bisphosphate</p> <p>F16P</p>
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<p>2PG</p> <p>2-Phosphoglycerate</p>  <p>2-Phosphoglycerate</p> <p>2PG</p>	<p>PEP</p> <p>Phosphoenolpyruvate</p>  <p>Phosphoenolpyruvate</p> <p>PEP</p>	<p>PYR</p> <p>Pyruvate</p>  <p>Pyruvate</p> <p>PYR</p>
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<p>CII</p> <p>Succinate dehydrogenase</p>  <p>Succinate dehydrogenase</p> <p>CII</p>	<p>UBI</p> <p>Ubiquinone</p>  <p>Ubiquinone</p> <p>UBI</p>	<p>CIII</p> <p>Cytochrome b<sub>c</sub></p>  <p>Cytochrome b<sub>c</sub></p> <p>CIII</p>
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<p>CI</p> <p>NADH dehydrogenase</p>  <p>NADH dehydrogenase</p> <p>CI</p>	<p>Energizing</p>  <p>Energizing</p>	<p>UBI</p> <p>Ubiquinone</p>  <p>Ubiquinone</p> <p>UBI</p>
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<p>PYR</p> <p>Pyruvate</p>  <p>Pyruvate</p> <p>PYR</p>	<p>Energizing</p>  <p>Energizing</p>	<p>AC</p> <p>Acetyl</p>  <p>Acetyl</p> <p>AC</p>
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<p>HET</p> <p>Hydroxyethyl</p>  <p>Hydroxyethyl</p> <p>HET</p>	<p>AC</p> <p>Acetyl</p>  <p>Acetyl</p> <p>AC</p>	<p>ACoA</p> <p>Acetyl Coenzyme A</p>  <p>Acetyl Coenzyme A</p> <p>ACoA</p>
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**Glycolysis: 400 points; Krebs Cycle: 300; Acetyl-CoA Synthesis: 100 points; ETC: 200**

# Credits



LABORATÓRIO DE MÍDIAS  
EDUCACIONAIS



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