Oxireduction's Studies of Arytetralone and Aryltetralol Mediated by *Rhodotorula* sp

Marina G. Capeletto[a*], Luiz S. Longo Jr[a], Wagner L. Batista[a], Graziela G. Bianco[a]

[a]*Universidade Federal de São Paulo – Instituto de Ciências Ambientais, Químicas e Farmacêuticas (ICAQF) Diadema, São Paulo, Brasil.*

**capelettomari@bol.com.br*

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NTRODUCTION

The Aristolochiaceae family presented extracts with antimalarial activity. Some aryltetralones lignans were isolated from *Holostylis reniformis* (Figure 1) and those are responsible for this antimalarical activity.[1,2]

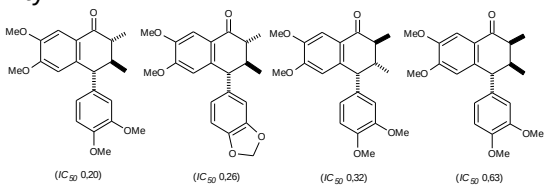


Figure 1: Aryltetralones isolated from *Holostylis reniformis*.

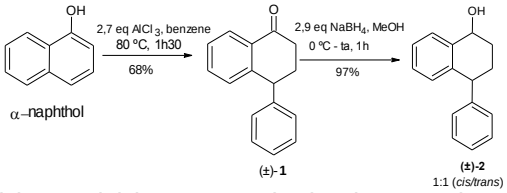
Biocatalysis has been shown to be a strong strategy to obtain enantiomerically pure substances, because it promotes reactions with high chemo-, regio- and stereoseletivity.[3]

This methodology show to be important because it's environmentally favorable, since various principles of Green Chemistry may be contemplated like possibility of using water as a solvent, especially when we using whole cells. These whole cells contain all necessary cofactors to promote the desired reaction and they are able to recycle them.[4,5]

RESULTS AND DISCUSSION

The aryltetralone (**1**) was synthesized by a Friedel-Crafts' reaction between α-naphthol and benzene, in the presence of $AlCl_3$.[6] The aryltetralol (**2**) was obtained by reduction of (±)-**1** with $NaBH_4$ and MeOH[7] (Scheme 1).

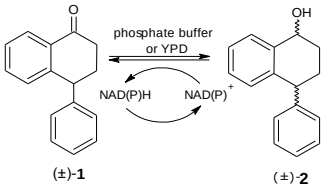
Scheme 1[6,7]



The (±)-**1** and (±)-**2** were submitted to reactions with *Rhodotorula* sp. This yeast was able to reduce α-tetralones with a substituent in 4-position.[8] The results are shown in Table 1. The bioreduction reactions occur with *Rhodotorula* sp, but the amount formed wasn't sufficient to be isolated, except in YPD. A higher yield was found in 24 h (Entry 4). The formation of both alcohols, *cis*-**2** and *trans*-**2**, occurred, except in 44 h in PBS (Entry 2).

The bio-oxidation reaction of (±)-**2** occurs and it seems more promising than bioreduction because the isolation of **1**, using column chromatography, was possible.

Table 1: Results of Reactions with *Rhodotorula* sp.[a]



Entry	Compound	Time	Cromatogram (%)
1	(±)-**1**	22 h	**1**(32%) *cis*-**2** (1%) *trans*-**2**(3%)
2		44 h	**1**(46%) *trans*-**2**(1%)
3[b]		8 h	**1**(30%) *cis*-**2** (12%) *trans*-**2**(10%)
4[b]		24 h	**1**(39%) *cis*-**2** (18%) *trans*-**2**(22%)
5[b]		48 h	**1** (62%) *cis*-**2** (7%) *trans*-**2** (11%)
6[b]	(±)-**2**	24 h	**1**(28%) *cis*-**2** (55%) *trans*-**2**(17%)

Reagents and Condictions:[a] Growth: 250 mL of YPD – Yeast Extract-Peptone-Dextrose Broth (pH = 6,5 ± 0,2), 150 rpm, 26 ºC, 24 h or 48h. Yeast mass: 40 mL of YPD centrifuged at 1200 rpm, 5 minutes, 25 ºC. Reaction: 40 mL PBS - Phosphate Buffered Saline or YPD, yeast mass, 0,4 mmol of (±)-**1** or (±)-**3**, 150 rpm, 26 ºC, time. Extraction: 3 x 20 mL of ethyl acetate. Co-solvent: dimethyl carbonate. [b]These reactions occur directly in YPD.

CONCLUSION

The *Rhodotorula* sp was able to make the reduction of (±)-**1** and oxidation of (±)-**2**, although with low yields.

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