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**OBTAINING OF ALKENES BY
REDUCTIVE COUPLING OF
CARBOXYLIC COMPOUNDS;
SYNTHESIS OF Z,E-6-DODECENE,
SYNTHESES OF FLEXIBILENE AND
ISOCARYOPHYLLENE,
MECHANISTIC VIEWS; THE ORGANIC
CHEMISTRY NOTEBOOK, N° 14**

**OBTENCIÓN DE ALQUENOS POR
ACOPLAMIENTO REDUCTIVO DE
COMPUESTOS CARBONÍLICOS;
SÍNTESIS DE Z,E-6-DODECENO,
SÍNTESIS DE FLEXIBILENO Y
ISOCARYOPHYLLENE, VISTAS
MECANICISTAS;
EL CUADERNO DE QUÍMICA
ORGÁNICA, N° 14**

Short review

José A. Bravo^{1,*}, José L. Vila²

¹Natural Product Laboratory, Phytochemistry, Chemical Sciences Department, School of Pure and Natural Sciences FCPN, Universidad Mayor de San Andrés UMSA, P.O. Box 303, Calle Andrés Bello s/n, Ciudad Universitaria Cota Cota, phone +59122792230, La Paz, Bolivia, jabravo@umsa.bo, joseabravo@outlook.com, www.umsa.bo

²Natural Product Laboratory, Green Chemistry, Chemical Sciences Department, School of Pure and Natural Sciences FCPN, Universidad Mayor de San Andrés UMSA, P.O. Box 303, Calle Andrés Bello s/n, Ciudad Universitaria Cota Cota, phone +59122772260, La Paz, Bolivia, jvila@umsa.bo, www.umsa.bo

Keywords: Organic Chemistry, Alkenes, Reductive coupling, Carbonyl, Aldehyde, Ketone, Flexibilene, Z,E-6-dodecene, Isocaryophyllene, Mechanisms of Reactions, J.E. McMurry, W. Carruthers.

ABSTRACT

The Organic Chemistry Notebook Series, a Didactical Approach, is the series designed with educational purposes in the organic synthesis field. With the present paper we add to a total of fourteen contributions so far in the series.

This series of studies is designed to help students when getting started in the synthesis subject. The method of learning includes many fully and explicitly designed reactions step by step. The best manner to understand a synthesis is by means of graphical views which have been proposed by the authors of the series, and when they are accompanied in most of the cases by illustrative comments by the authors that describe the graphical mechanistic proposals and add some criteria deduced from the different mechanistic steps. We have taken a series of reactions compiled by W. Carruthers in 'Some modern methods of organic synthesis', and we have proposed didactical and mechanistic views for them. This theme is included in the chapter "Formation of carbon-carbon double bonds" in the mentioned text.

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**EFFECT OF TEMPERATURE ON
ACOUSTIC AND VOLUMETRIC
PROPERTIES OF LIQUID BINARY
MIXTURES OF PROPANENITRILE
AND BUTYL ACETATE, AND OF
LIQUID BINARY MIXTURES OF
PROPANENITRILE AND PENTYL
ACETATE**

**EFFECTO DE LA TEMPERATURA EN
LAS PROPIEDADES ACÚSTICAS Y
VOLUMÉTRICAS DE MEZCLAS
BINARIAS LÍQUIDAS QUE
CONTIENEN PROPANONITRILO Y
ACETATO DE BUTILO, Y
PROPANONITRILO Y ACETATO DE
PENTILO**

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Full original article

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Canzonieri, S.¹, Mariano, A.^{1,2}, Camacho, A.^{1,3,*}, Orozco, M.¹, Romaní, L.⁴

¹Facultad de Ingeniería, Universidad Nacional del Comahue, Buenos Aires 1400 (8300) Neuquén- Capital, Patagonia, República Argentina, Phone (0299)4490-348, www. <http://fainweb.uncoma.edu.ar/>

²Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina, <https://www.conicet.gov.ar/>

³Facultad Regional del Neuquén, Universidad Tecnológica Nacional, (8300) Av. Pedro Rotter S/N Barrio Uno, soporteweb@frn.utn.edu.ar, Phone +54 299 4960510 // 3292, Fax +542994961162, Neuquén, Argentina <http://www.frn.utn.edu.ar/>

⁴Facultade de Ciencias, Campus As Lagoas s/n, E32004 Ourense, Phone +349888387000, sdefco@uvigo.es, <http://www. http://fcou.uvigo.es/gf/>

Keywords: *Excess molar volume, Speed of sound deviation, Isobaric thermal expansion coefficient, Excess isentropic compressibility, Models for the speed of sound, Propanenitrile, Butyl acetate, Pentyl acetate.*

ABSTRACT

In this paper we present density (ρ) experimental data and sound velocity (u), for the binary systems: propanenitrile + butyl acetate and propanenitrile + pentyl acetate at atmospheric pressure and in a temperature range of 278, 15 K to 318,15 K every 5 K.

The molar volumes, $V(x, T)$, excess molar volumes, $VE(x, T)$, isobaric thermal expansion coefficient, $\alpha(x, T)$, excess isobaric thermal expansion coefficient, $\alpha E(x, T)$, the speeds of sound deviations, $\Delta u(x, T)$, isentropic compressibility, $\kappa S(x, T)$, and excess isentropic compressibility, $\kappa SE(x, T)$, were determined from experimental information. Every set of results of properties of the excess was fitted to a polynomial equation like the Redlich-

Kister equation [1], dependent on molar fraction and temperature, giving place to diversions of the size of the experimental mistake.

The studied binary mixture showed negative values of αE , Δu y κSE , in the whole range of composition and at all temperatures. The prediction of the speed of sound was calculated with the models proposed by Nomoto [2,3], Van Deal [4] and Ernst et al [5].

*Corresponding author: alberto.camacho@fain.uncoma.edu.ar



**SAPOGENINS FROM THE HUSK OF
CHENOPODIUM QUINOA, THE
OBTAINING OF THEIR DERIVATIVES,
AND THE EVALUATION OF THEIR
CYTOTOXIC ACTIVITY**

**SAPOGENINAS DE CÁSCARAS
DE *CHENOPODIUM QUINOA*,
OBTENCIÓN DE SUS
DERIVADOS, Y EVALUACIÓN
DE SU ACTIVIDAD CITOTÓXICA**

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Full original article

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Yaquelin Suño¹, Maribel Lozano^{1,2}, Wendy Soria^{3,4}, Stina Oredsson⁴, Giovanna R. Almanza^{1,*}

¹Bioorganic Laboratory, Instituto de Investigaciones Químicas, Universidad Mayor de San Andrés, La Paz, Bolivia, CP 303, Calle 27, Cota-Cota, La Paz – Bolivia, www.umsa.bo

²Centre for Analysis and Synthesis, Lund University, Lund, Sweden, SE-221 00, Naturvetarvägen 14 (former Getingevägen 60) /Sölvegatan 39 A-C, Lund –Sweden

³Institute of Molecular Biology and Biotechnology, Universidad Mayor de San Andrés, La Paz, Bolivia, Calle 27, Cota-Cota, La Paz – Bolivia, www.umsa.bo

⁴Department of Biology, Lund University, Sweden, SE-223 62, Sölvegatan 35, Lund-Sweden

Keywords: *Quinoa*, *Sapogenins*, *Acid hydrolysis*, *Oleanolic acid derivatives*, *Cytotoxic evaluation*, *JIMT-1*, *MCF-10A cells*.

ABSTRACT

In this paper, we present the evaluation of two types of methods for obtaining sapogenins by acid hydrolysis of a hydroalcoholic extract rich in saponins from quinoa husks. In the first method, called microwave method, the acid solution of saponins was pre-stirred for one minute in a microwave and then was heated and stirred at 100° C for 15 min. In the second one, called conventional method, the same acid solution was heated and stirred at 80 °C for 4 h. The results show that the conventional method is better to obtain more quantity of sapogenins. Then four sapogenins were isolated: oleanolic acid (1), methyl oleanate (2), hederagenin (3), and phytolaccagenic acid (4). The cytotoxicity of the compounds was evaluated in human JIMT-1 breast cancer cells and human MCF-10A normal-like breast epithelial cells. The most active compound is hederagenin, which is more toxic in JIMT-1 cells (IC₅₀ 27.3 μM) than in MCF-10A cells (IC₅₀ 39.6 μM). Methyl oleanate is somewhat less toxic than hederagenin while oleanolic acid and phytolaccagenic acid needed treatment concentrations up to 100 μM to become cytotoxic. Finally, we obtained four new derivatives of oleanolic acid, the major sapogenin isolated, by oxidation of the OH group in C-3 to carbonyl (5) and subsequent reaction of aldol condensation, adding to carbon C-2 the follow aldehydes: benzaldehyde 6a, *p*-methylbenzaldehyde 6b, *m*-methylbenzaldehyde 6c, and *o*-methylbenzaldehyde 6d, these synthesis were carried out in order to incorporate a Michael-acceptor into a molecular structure to enhance the biological activity, we obtained yields of around 50% for 6a and 6b, and of around 10% for 6c and 6d.

*Corresponding author: gjoyvalmanza@gmail.com, galmanza3@umsa.bo