MISLEADING COMBINING FORMS: *HYDR(O)-*

ZBUNJUJUĆE SLOŽENICE: *HYDR(O)-*

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Abstract. *The purpose of this study is to help students in chemistry and in any other field related to chemistry differentiate, better understand and use more properly the terms beginning with* ***hydr(o)-****, terms that can be misleading because of their different referent ('hydrogen', 'water', and 'hydrargyrum'). In our attempt, we have used the lexicological approach. We have found out that there are about 84% combined words with* ***hydr(o)-*** *('hydrogen') and* ***hydroxy(l)-****. There were no limitations to this study. The practical implication of the study is that all these combined words make up an exhaustive inventory which, if properly acquired by the students, can help them decipher more easily the meaning of any specialised text in English.*

Sažetak. *Ovo istraživanje ima za cilj pomoći studentima kemije i srodnim područjima da bolje razlikuju, razumiju i pravilnije koriste izraze koji počinju s* ***hydr(o)-****, a mogu dovesto do zabune („hydrogen", „vod", i „hydrargyrum"). U svom radu smo se koristili leksikološkim pristupom. Ustanovili smo da postoji oko 84% složenica koje počinju s* ***hydr(o)-*** *(„hydrogen") and* ***hydroxy(l)-****. U ovom radu nema ograničenja. Praktična primjena ove studije ogleda se u tome što sve složenice čine iscrpni popis koji, ako ga studenti pravilno usvoje , može doprinijeti boljem prevođenju bilo kojeg stručnog teksta na engleskom jeziku. Vrijednost ovog rada leži u činjenici da je ovo prvi popis riječi koji počinje s* ***hydr(o)-*** *(„hydrogen") i* ***hydroxy(l)-*** *analiziran s leksikološkog aspekta.*

Key words: ***hydr(o)-****, loanword, combined form, derivative, back-formation, English of chemistry.*
Ključne riječi: ***hydr(o)-****, posuđenica, složenica, izvedenica, engleski u kemiji.*

INTRODUCTION

Teaching the English vocabulary of chemistry and hydrology can result in a lot of confusion, as there are tens of terms apparently shared between the two sciences, but which are not what they seem to be. Thus, there are words with ***hydr(o)-***^{2} in chemistry (see below), words with ***hydr(o)-***^{1} in hydrology (RAȚĂ & PROCA, 2006), and words with ***hydr-*** from hydrargyrum.

All these specialised terms are confusing and misleading, particularly when it comes to achieving the global understanding of a text in a foreign language and to translating specialised texts from a foreign language (in our case, English). It is possible to help students dissipate the mist caused by the frequency of terms with ***hydr(o)-***.

MATERIAL AND METHOD

We have inventoried all the terms with ***hydr(o)-***^{2} ('a combining form representing **hydrogen** in compound words, denoting especially a combination of hydrogen with some negative element or radical. Also, especially before a vowel, ***hydr-***^{2}') and with its derivative ***hydroxy(l)***, with the help of the best comprehensive English language dictionary available (Webster Comprehensive Dictionary, 1995).

We then grouped them into two groups (***hydr-***^{2}, ***hydroxy(l)***), pointing out the main element in each of them, that helps better identifying and understanding them in the process of learning.

RESULTS AND DISCUSSION

The total number of words with ***hydr(o)-***^{2} is 49, of which 1 (2%) is a loanword, 41 (84%) are combined words, 1 (2%) is a derivative, and 6 (12%) are back-formations.

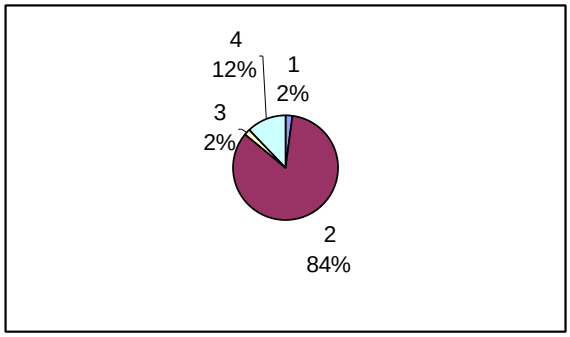

Figure 1 - Words with ***hydr(o)-*** in the English of chemistry:
1 – loanwords, 2 – combined words, 3 – derivatives, 4 – back-formations.

1. Loanwords. A **loanword** is "a word adopted or borrowed, usually with little modification, from another language" (CHALKER & WEINER, 1994). There is only one **loanword** (from German) among the words with ***hydro-*** in the English of chemistry: ***hydronium*** (as in ***hydronium*** *ion*) 'adj. of or related to *hydronium ion*. [< G *Hydronium* (1907), contr. of *Hydroxonium*; see HYDRO-^{2} + OXONIUM ION]'. As we can see, there is no modification whatsoever in form, the only modification being in pronunciation.

2. Combined words. A **combined word** is a word resulted from the combination of a **combining word** "a bound form used in conjunction with another linguistic element in the formation of a word" (CHALKER & WEINER, 1994). A large number of words with ***hydr(o)-*** in the English of chemistry result from the combination of ***hydr(o)-*** with other words, fragments of words, or combining forms. Of the 28 words with ***hydr(o)-***^{2}, 10 (36%) are combined with ***hydr-***^{2} and 18 (64%) with ***hydro-***^{2}:

- words combined with ***hydr-***^{2}: ***hydracid*** 'an acid that does not contain oxygen, as hydrochloric acid, HCl. [HYDR-^{2} + ACID]', ***hydralazine*** '*Pharm.* a white crystalline powder, $C_8H_8N_4$, that dilates blood vessels and is used in the treatment of hypertension. [HYDR-^{2} + (PHTH)AL(IC) + AZINE]', ***hydrazine*** '1. also called ***diamine***, a colourless, oily, fuming liquid, N_2H_4, that is a weak base in solution and forms a large number of salts resembling ammonium salts: used chiefly as a reducing agent and a jet-propulsion fuel. 2. a class of substances derived by replacing one or more hydrogen atoms in hydrazine by an organic group. [HYDR-^{2} + AZ- + -INE^{2}]', ***hydrazoic*** (as in ***hydrazoic*** *acid*) 'adj. noting or pertaining to hydrazoic acid; triazoic. [HYDR-^{2} + AZ- + -IC]', ***hydrazone*** 'any of a class of compounds containing the group > C = NNH_2. [HYDR-^{2} + AZ- + (RET)ONE]', ***hydric***^{2} 'adj. pertaining to or containing hydrogen. [HYDR-^{2} + -IC]', ***hydride*** 'a binary compound formed by hydrogen and another, usually more electropositive, element or group, as sodium hydride, NaH, or methyl hydride, CH_4. [HYDR-^{2} + -IDE]', ***hydriodic*** (as in ***hydriodic*** *acid*) 'adj. of or derived from hydriodic acid. [HYDR-^{2} + IODIC]', ***hydroxide*** (also in ***hydroxide*** *ion*) 'a chemical compound containing the hydroxyl group. [HYDR-^{2} + OXIDE]', ***hydroxy(l)-*** (as in ***hydroxy*** *acid*, ***hydroxyl*** *group*, ***hydroxyl*** *radical*, ***hydroxyl*** *ion*) 'a combining form used in the names of chemical compounds in which the hydroxyl group is present. [HYDR-^{2} + OX(Y) + -YL]';

- words combined with ***hydro*^{2}-**: ***hydrobromic*** (as in ***hydrobromic** acid*) ‘adj. *Chem.* of or derived from hydrobromic acid. [HYDRO-^{2} + BROMIC]’, ***hydrocarbon*** ‘any of a class of compounds containing only hydrogen and carbon, as an alkane, methane, CH_4, an alkene, ethylene, C_2H_4, an alkyne, acetylene, C_2H_2, or an aromatic compound, benzene, C_6H_6. [HYDRO-^{2} + CARBON]’, ***hydrochloric*** (as in ***hydrochloric** acid*) ‘adj. of or derived from hydrochloric acid. [HYDRO-^{2} + CHLORIC]’, ***hydrochloride*** ‘a salt, especially of an alkaloid, formed by the direct union of hydrochloric acid with an organic base that makes the organic constituent more soluble. [HYDRO-^{2} + CHLORIDE]’, ***hydrochlorothiazide*** ‘*Pharm.* a crystalline, water-insoluble powder, $C_7H_8ClN_3O_4S_2$, used as a diuretic and in the treatment of hypertension. [HYDRO-^{2} + CHLOROTHIAZIDE]’, ***hydrocinnamic*** (as in ***hydrocinnamic** acid*, ***hydrocinnamic** aldehyde*) ‘adj. of or derived from hydrocinnamic acid. [HYDRO-^{2} + CINNAMIC]’, ***hydrocortisone*** ‘1. *Biochem.* a steroid hormone, $C_{21}H_{30}O_5$, of the adrenal cortex, active in carbohydrate and protein metabolism; 2. *Pharm.* also called ***cortisol***, a powerful anti-inflammatory drug, $C_{21}H_{30}O_5$, used in the treatment of shock, allergies, certain forms of arthritis, and other conditions. [HYDRO-^{2} + CORTISONE]’, ***hydrocracking*** ‘the cracking of petroleum or the like in the presence of hydrogen. [HYDRO-^{2} + CRACKING]’, ***hydrocyanic*** (as in ***hydrocyanic** acid*) ‘adj. of or derived from hydrocyanic acid. [HYDRO-^{2} + CYANIC]’, ***hydrodesulphurisation*** ‘desulphurisation by catalytic agents of the sulphur-rich hydrocarbons obtained from petroleum or the like during cracking or hydrocracking. [HYDRO-^{2} + DESULPHURIZATION]’, ***hydrofluoric*** (as in ***hydrofluoric** acid*) ‘adj. of or derived from hydrofluoric acid. [HYDRO-^{2} + FLUORIC]’, ***hydroforming*** ‘the production of high-octane aromatic compounds for motor fuels by catalytic reforming of naphtas in the presence of hydrogen. [HYDRO-^{2} + (RE)FORMING]’, ***hydroformylation*** ‘the addition of a hydrogen atom and the formyl group to a double bond of a hydrocarbon by reaction with a mixture of carbon monoxide and hydrogen in the presence of a catalyst. [HYDRO-^{2} + FORMYL + -ATION]’, ***hydronitrogen*** ‘a chemical compound containing only hydrogen and nitrogen. HYDRO-^{2} + NITROGEN]’, ***hydroperoxide*** ‘any chemical compound having the general formula, ROOH, where R is an element or an organic group. [HYDRO-^{2} + PEROXIDE]’, ***hydrosulphate*** ‘a salt formed by the direct union of sulphuric acid with an organic base, especially an alkaloid, and usually more soluble than the base. [HYDRO-^{2} + SULPHATE]’, ***hydrosulphide*** ‘a compound containing the universal group –HS. [HYDRO-^{2} + SULPHIDE]’, ***hydrosulphurous*** ‘adj. hyposulphurous. [HYDRO-^{2} + SULPHUROUS]’;

Of the 13 words combined with ***hydroxy(l)-***, 10 (77%) are combined with ***hydroxy-*** and 3 (23%) with ***hydroxyl***:

- words combined with ***hydroxy-***: ***hydroxyacetic*** (as in ***hydroxyacetic** acid*) ‘adj. of or derived from hydroxyacetic acid [HYDROXY- + ACETIC]’, ***hydroxyapatite*** ‘a mineral, $Ca_{10}(PO_4)_6OH_2$, that is the principal storage form of calcium and phosphorus in bone. [HYDROXY- + APATITE]’, ***hydroxybenzene*** ‘phenol. [HYDROXY- + BENZENE]’, ***hydroxybutyric*** (as in ***hydroxybutyric** acid*) ‘adj. of or related to hydroxybutiric acid. [HYDROXY- + BUTYRIC]’, ***hydroxychloroquine*** ‘*Pharm.* a colourless crystalline solid, $C_{18}H_{26}ClN_3O$, used in the treatment of malaria, lupus erythematosus, and rheumatoid arthritis. [HYDROXY- + CHLOROQUINE]’, ***hydroxyketone*** ‘a ketone containing a hydroxyl group. [HYDROXY- + KETONE]’, ***hydroxynaphthalene*** ‘naphtol. [HYDROXY- + NAPHTHALENE]’, ***hydroxyproline*** ‘*Bio-chem.* a nutritionally nonessential amino acid, $C_5H_9NO_3$, found chiefly in collagen. [HYDROXY- + PROLINE]’, ***hydroxyurea*** ‘*Pharm.* a synthetic compound, $CH_4N_2O_2$, used in cancer therapy. [HYDROXY- + UREA]’, ***hydroxyzine*** ‘*Pharm.* an antihistaminic compound, $C_{21}H_{27}ClN_2O_2$, used in the treatment of allergy, nausea, and anxiety. [HYDROXY- + (PIPERA)ZINE]’;

- words combined with ***hydroxyl***: ***hydroxylamine*** 'an unstable, weakly basic, crystalline compound, NH_3O, used as a reducing agent, analytical reagent, and chemical intermediate. [HYDROXYL + -AMINE]', ***hydroxylase*** '*Biochem.* any enzyme that catalyses the introduction of a hydroxyl group into a substance. [HYDROXYL + -ASE]', ***hydroxylic*** 'adj. pertaining to hydroxyl group [HYDROXYL + -IC]'.

3. Derivatives. A **derivative** is a word "formed from another word by a process of derivation" (CHALKER & WEINER, 1994). There is a single **derivative** among the words with ***hydro-*** belonging to the English of chemistry, derived from a combined word with ***hydro-***: ***hydrocarbonaceous*** 'adj. resembling, having the nature of, made of [HYDROCARBON + -ACEOUS]'.

4. Back-formations. A **back-formation** is "a new word [formed] by the removal of (real or apparent affixes etc. from an existing word; a word that is an instance of this" (CHALKER & WEINER, 1994). Of the total of 49 termed combined with ***hydr(o)-*** and ***hydroxy(l)-***, 7 are **back-formations**: ***hydrazoate*** 'a salt of hydrazoic acid; azide [HYDRAZO(IC ACID) + -ATE[2]]', ***hydrobromide*** 'a salt formed by the direct union of hydrobromic acid and an organic base, especially an alkaloid, usually more soluble than the base. [HYDROBROM(IC) + -IDE]', ***hydrocinnamaldehyde*** 'hydrocinnamic aldehyde. [HYDROCINNAM(IC) + ALDEHYDE]', ***hydrocracker*** 'a high-pressure processing unit used for hydrocracking. [HYDROCRACK(ING) + -ER[1]]', ***HydroDiuril*** '*Pharm., Trademark.* a brand of hydrochlorothiazide. [HYDRO(CHLOROTHIAZIDE) + DIURIL]', ***hydrosulphite*** '*Chem.* 1. hyposulphite. 2. See *sodium hydrosulphide*. [HYDROSULPH(UROUS) + -ITE[1]]'.

CONCLUSIONS

The massive presence of words resulting from the combination with ***hydr(o)-*** (84%) shows that the English language, as well as other European languages, was able to enrich its vocabulary with the help of internal means during a period of time that was marked by the swing of technology and sciences.

It is particularly combining forms such as *acetic* (*hydroxy**acetic***), *acid* (*hydr**acid***), *aldehyde* (*hydrocinnam**aldehyde***), *amine* (*hydroxyl**amine***), *apatite* (*hydroxy**apatite***), *azine* (*hydral**azine***), *benzene* (*hydroxy**benzene***), *bromic* (*hydro**bromic***), *butyric* (*hydroxy**butyric***), *carbon* (*hydro**carbon***), *chloric* (*hydro**chloric***), *chloride* (*hydro**chloride***), *chloroquine* (*hydroxy**chloroquine***), *chlorothiazide* (*hydro**chlorothiazide***), *cinnamic* (*hydro**cinnamic***), *cortisone* (*hydro**cortisone***), *cyanic* (*hydro**cyanic***), *desulphurisation* (*hydro**desulphurisation***), *fluoric* (*hydro**fluoric***), *iodic* (*hydr**iodic***), *formylation* (*hydro**formylation***), *ketone* (*hydroxy**ketone***), *naphthalene* (*hydroxy**naphthalene***), *nitrogen* (*hydro**nitrogen***), *oxide* (*hydr**oxide***), *peroxide* (*hydro**peroxide***), *proline* (*hydroxy**proline***), *sulphate* (*hydro**sulphate***), *sulphide* (*hydro**sulphide***), *sulphite* (*hydro**sulphite***), *sulphurous* (*hydro**sulphurous***), *urea* (*hydroxy**urea***) that can help better understand the English of chemistry.

LITERATURE

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