

STABILITY AND QUALITY

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The research conducted by TWYDIL® to optimize its formulas would be vain and uninteresting if special attention was not paid to ensuring optimal stability of the components in every single product from manufacturing to best-before date. To achieve this goal, TWYDIL® not only carefully selects its ingredients, the type of packaging and of storage but also supervises the manufacturing process and permanently increases its controls.

1. Selection of the raw materials

By “selection of the raw materials” we mean not only the selection of the vitamins and dietary minerals but also the selection of plant extracts or probiotics and further additives in the composition of the products of the range.



The first criterion of selection is the standardisation the product's concentration in active substances and the absence of contamination in it. The second criterion is the product's intrinsic quality as a guarantee for long lasting efficiency. Let us take two examples:

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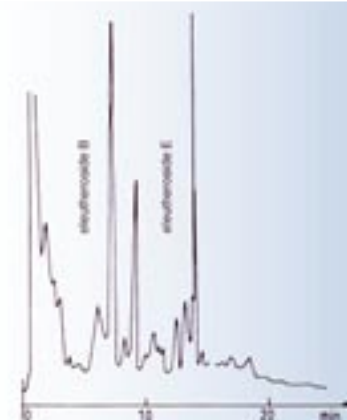
- Ascorbic acid which is best known as vitamin C. Three types of vitamin C are used in the range: a first type suitable for packaging in sachets, (TWYDIL® VIGORADE, TWYDIL® PROTECT PLUS,...); a second, more stable type which is coated and hence allows pelletisation (TWYDIL® RACING, TWYDIL® BEBACK,...) and a third type which remains stable in aqueous environments (TWYDIL® ELECTROLYTES syringe). In all three cases, the intrinsic type of the molecule used is confirmed by results of a content control of vitamin C.

- Standardised extract of *Eleutherococcus senticosus*, *Maxim.* an essential component of TWYDIL® HIPACAN+C. Its use requires special caution such as, for example, a verified absence of natural contamination in the extract batches. This control is done by the LCH that then issues a certificate of absence of contaminants such as caffeine, theophylline, morphine, atropine etc. Besides, this plant extract may be more or less concentrated in active substances depending on factors with specific influence on its growth such as the type of soil, the level of insolation and of rainfall. Consequently, it is crucial for TWYDIL® to be able

to standardise the concentrations of active substances in the components in order to ensure a constant homogeneity of the products. The same controls apply to all the plant extracts used for the whole range.

2. Production technique

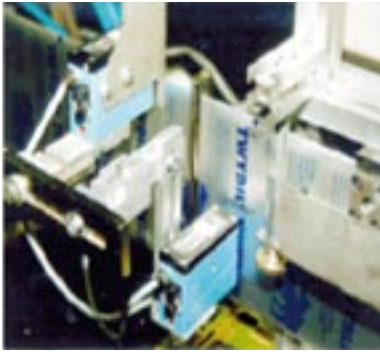
The production technique used for the feed supplement (whether liquid, powder or granular) should not cause any destruction of the active substances. Variations in temperature, pressure or moisture are harmful to vitamins while oxidation phenomena must be avoided for some types of fatty acids (such as omega 3).



Determination by chromatography of the eleutherosides contained in TWYDIL® HIPACAN+C

- TWYDIL® RACING is highly concentrated in vitamins, dietary minerals, magnesium and amino acids. The production of its granules requires meticulous control: a thermal probe *in situ* ensures a regulated speed of production and a temperature of production kept





Filling of sachets

below 62°C. Addition of water is prohibited because water destroys some vitamins.

- TWYDIL® OMEGADIL is heavily enriched with omega 3 fatty acids. Beyond a ratio of 5% of omega fatty acids in a product, oxidation phenomena occur and make it inefficient or even harmful. Consequently, TWYDIL® OMEGADIL is produced under air-free (nitrogen or vacuum) conditions from the refining of the fatty acids up to packaging.



3. Adequate packaging

The packaging must be chosen carefully! On the one hand it must ensure stability of the finished product and on the other hand it must make its administration easy. It may happen that both criteria are in conflict with each other (in terms of cost, comfort, stability etc.).

The example of mouth syringes is an interesting one. On the one hand we have the electrolyte syringe designed to make product administration easy, and on the other hand we have TWYDIL® STOMACARE



for which administration with a mouth syringe is a necessary condition for its maximal efficiency.

The use of sealed aluminium polyester

sachets for individual doses has become a rule for a large part of the TWYDIL® range, with the advantage that they preserve the active substances in the products, which results in a longer shelf life. In this regard, TWYDIL® ARTRIDIL

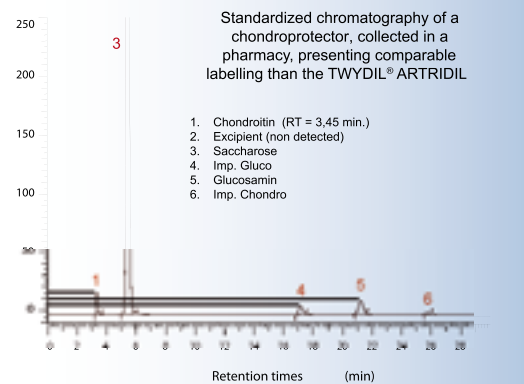
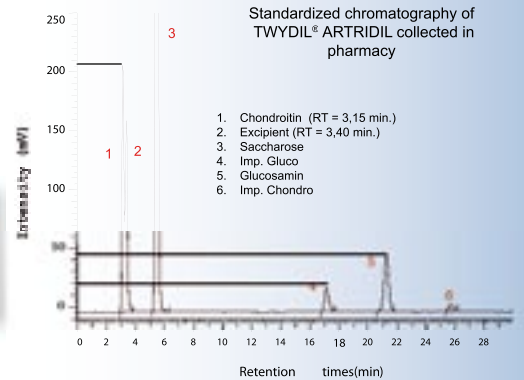


has been studied by the office of chemical analysis of the ULg where it has been compared to other chondroprotectors. It turned out that the other tested competing chondroprotectors did not meet the requirements of guarantee. One of the possible causes advanced by the university is the loose packaging of the products, which would not ensure the stability of glucosamine and other complex sugars.

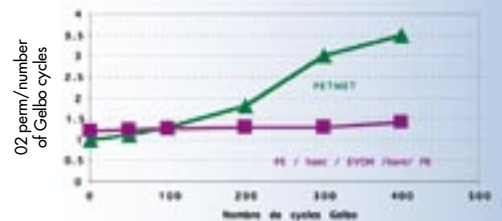
The case of TWYDIL® OMEGADIL is even more interesting! As you already know, it is manufactured under nitrogen in order to prevent fatty acids from oxidising. Hence, the packaging must also protect the product against oxygen; this is achieved by giving the packaging a special lining with different protective films that keeps oxygen away. On top of this, the cap for daily doses is designed in such a way that it blocks air penetration during administration. Mind you, researchers have shown at the conference on Free Radical Biology and Medicine (FRBM) that the risk for men to suffer from arteriosclerosis or inflammation (tendinitis, arthrosis) is higher with the ingestion of oxidised fatty acids.

4. Storage

TWYDIL® products are stored in a spacious warehouse located about twenty kilometres from Basel. This warehouse complies with the strict regulations of Swiss authorities. The products are under



Influence of Gelbo cycles on oxygen permeability



Comparison of oxygen permeability of EVOH and PETMET films

constant supervision regarding not only their physical condition but also temperature and moisture. In addition, and in order to prevent any secondary contamination of the packages, coffee, tea or even chocolate are prohibited in the warehouse by the internal company rules of TWYDIL®.

5. Quality control

Quality control at TWYDIL® is twofold: an anti-doping control and a conformity analysis of content and label for the components in every product. This control is carried out on a representative sample of the batch.

The anti-doping certification remains the key advantage of TWYDIL® clients throughout the world. Every batch undergoes a threefold test by the LCH:



Responsible of storage and warehouse
Christophe Muller

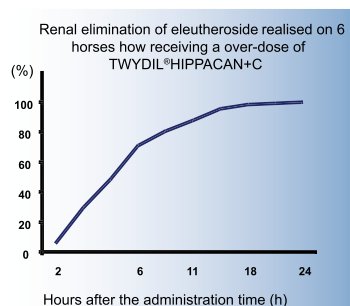
- Finished product test: the LCH investigates the presence of natural contaminants.
- Urine test on a horse after an overdose with the product: the LCH carries out a “full screening” identical to the one undergone by a winning horse of the “Prix d’Amérique” or the “Prix de l’Arc de Triomphe”.
- Blood test on a horse after an overdose with the product: the LCH undertakes here too a “full screening”.

You can access all the certificates on www.twydil.com by entering

the product batch number. Hence, all TWYDIL® products can be used until the day of competition without any risks*.

The analysis of the constituents is essential to guarantee a constant quality of TWYDIL® products. The most sensitive additives are tested in every batch, and one or two less unstable elements are tested at random in the process of verification of the production. The analyses are carried out by independent laboratories with a CE certification and authorization or by the Swiss official control office. TWYDIL® has also tested the level of preservation of its products under extreme conditions of moisture and temperature (cf. HPH 06/07). The outcome was a high stability of the active substances.

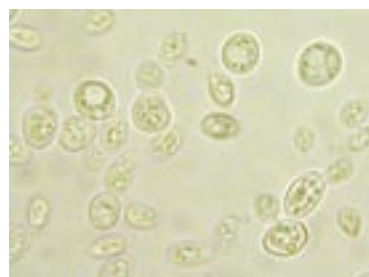
During the manufacturing process, we subject every active substance to an experiment of overdose for the purpose of achieving a more satisfactory analysis result for the finished product, while considering simultaneously the coefficient of variation related to the inaccuracy of the technique of analysis.



Eleutheroside's kinetics of elimination



Photo representing a probiotic culture utilized in TWYDIL® productions



Picture of yeast in optical microscopy

6. Conclusion

Before being launched on the market, a TWYDIL® product must have passed the numerous necessary analyses (at the stage of raw material or after production). The launching means also that the product has received an anti-doping certification and has passed a quality control test in terms of long lasting efficiency and stability up to best before date. ■



* except TWYDIL® HIPACAN+C, TWYDIL® MUCOPROTECT and TWYDIL® ARTRIDIL with *Harpagophytum* for which a withdrawal period of 48 hours must be allowed before any competition. This guarantee is not meant to substitute the regulations in force in the country of use.