

APEOS Case Study

Investigation into the current compliance to APEOs ban
2016

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By Detox Commitment, Miroglio Fashion committed to erase APEOS from the Supply Chain, either from producing processes and products (raw materials and finished items).

Alkylphenolic compounds, which contain nonylphenols and octylphenols and the etoxylates - in particular (NPEOs) and (OPEOs), are largely used compounds for their surface-active properties. Alkylphenoletoxylates (APEOs) have been largely used in washing and dyeing. Since the early '00s, their use has been banned in EU due to their toxicity to water system. In particular, we are talking about molecules whose demolition products coming from industrial water purification are toxic to water life, and they persist into the environment because they do not downgrade easily and they can accumulate in living organisms as long as reaching man through food chain contamination. Their similarity to natural oestrogens can interfere with sexual development of some organisms. In particular, fish can be affected by feminization.

In Europe, commercialization and use of nonylphenoletoxylates in chemical formulations in a concentration greater than 0.1% weight wise is forbidden since 2005 (Directive 2003/53/EC) and REACH rules forbid its disposal in water.

Miroglio Fashion, which always cares about consumer's health, in 2013, conducted an investigation about bought materials, introducing, on its RSL, voluntary limits more strict than all suppliers have to respect.

SCREENING RESULT

Test reports are done by a certified lab using a method based on a direct determination of APEOS through liquid chromatography-mass spectrometry (LC-MS/MS).

We made a first screening at the end of 2016 after picking 2864 pieces produced in the year as you can observe in *Figure 1*. The amount of fail tests was 1064; consequently, talking in percentage the 37% of the reports showed fail tests. The amount of the tests has increased by 468 from 2015.

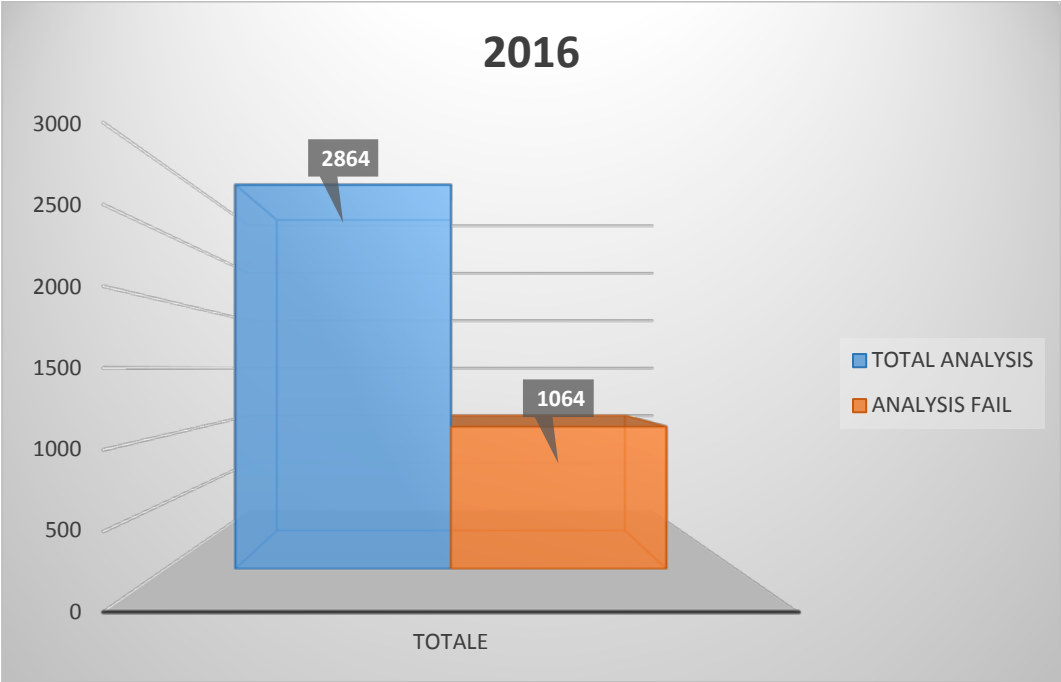


Figure 1 General Analysis 2016

Figure 2 compares the concentration of APEOs in the different fibers. The main fibers are Animals, Synthetic, Fur, Artificial and Vegetable fibers.

The critical situation regarding this assessment can be identified with the animal fibers followed by Fur.

If compared to the year 2015, the animal fiber concentration has improved by 3%, however, the Fur fiber has worsened its concentration of APEOs, from 43% in 2015 has reached almost 53%, while the synthetic fibers has lowered its level to 40.6% from 43% in 2015.

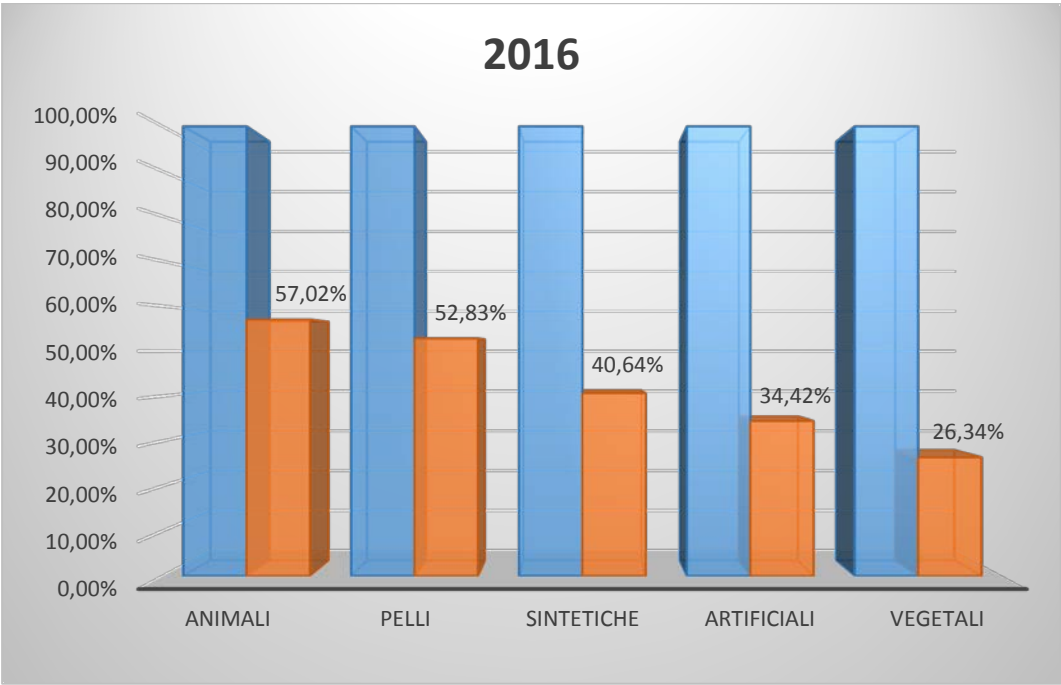


Figure 2 Types of Fibers 2016

In *Figure 3* the APEOs' concentration is identified by country. The following graph lists the countries with highest amount of tests. It can be clearly observed the percentage of fail tests in each country.

If compared to 2015 there four main countries that show significant results that should be considered in order to improve future tests and also strategies.

1. China: even if its tests are still with the highest amount of APEOs concentration, the graph shows an improvement from 60.5% to 49.4%;
2. South Korea: presents an improvement from 32.6% in 2015 to 22% compared to 2015.
3. Italy: presents a worsening, from 28% in 2015 to 42.8% in 2016;
4. Tunisia: presents a worsening, from 25% in 2015 to 42% in 2016.

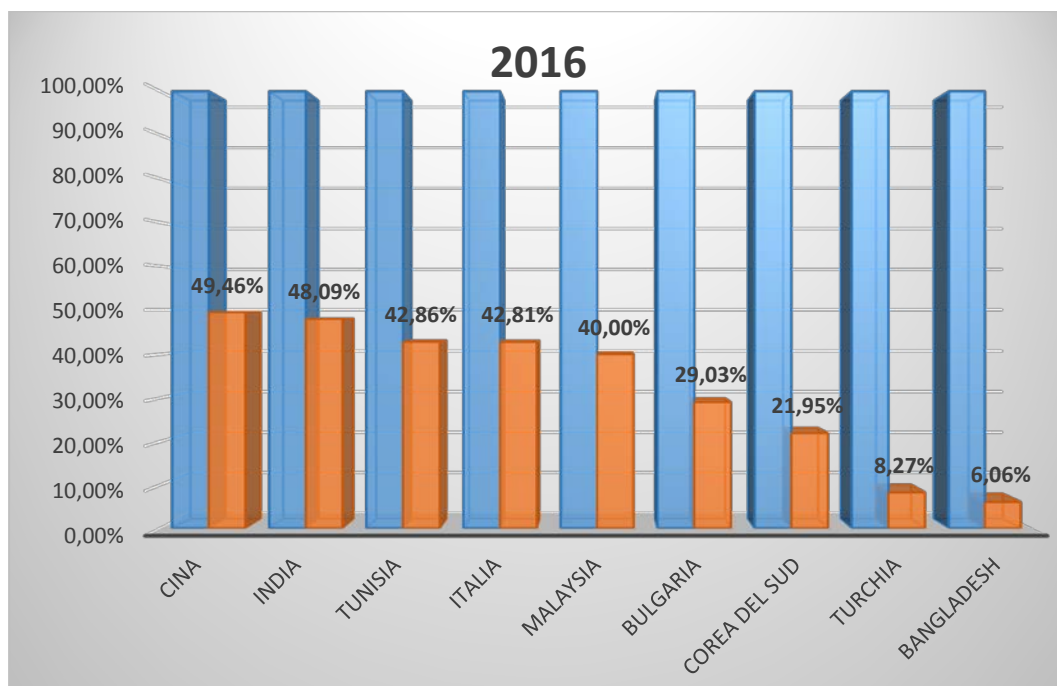


Figure 3 APEOs concentration divided by country in 2016

We are considering, as an acceptance limit, 1 mg/kg APEOS concentration. All the samples having an APEOS concentration greater than that have to be considered as failed.

FAILED percentage is about 37%.

Figure 4 as said before, every test having a higher level of concentration than 1 mg/kg is considered failed. However, it is significant to divided the concentration of APEOs in different ranges.

Figure 4 summarises the way concentration of APEOs is distributed. The most critical values are represented by the 12% (10 -50), 3% (50 -10) and 3% (>100). This graph is one of the most important during this test analysis. It underlines the improvmet achieved by Miroglio Fashion.

It is importnt to focus on the improvement points. First of all, the concentration above 100 has decreased to 3% from 4% in 2015. Moreover, the value between 10 and 50 has as well decreased to 12% from 13%. It means that in total 82% (63% + 19%) of the tests are below 10.

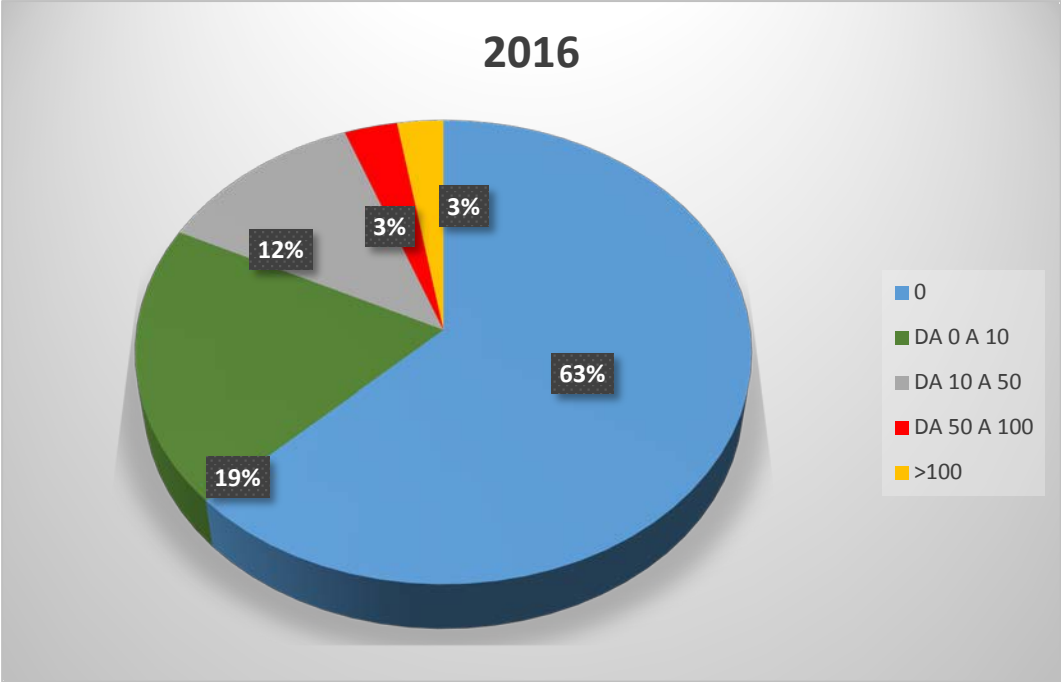


Figure 4 APEOs concentration 2016