COSMED
L'ASSOCIATION DES PME DE LA FILIÈRE COSMÉTIQUE

COSMED contribution to ECHA consultation – PFAS-TFA

SECTION III. Non-confidential comments

General comments

As a general comment, with around 10,000 individual substances, the scope of substances regulated by the proposed restriction measure is unprecedented, as is the scope of regulated applications. The economic and social impact of such a measure will be massive and should be more carefully assessed.
The PFAS restriction takes a completely new approach to describe hazard, risks and economic impacts. In some cases, conclusions in the Annex XV dossier are based on anecdotal knowledge, individual cases or non-representative small samples. Furthermore, in some places the dossier explicitly recognizes that, due to the random samples, extrapolation of the data to the entire EU or EEA is not possible or only possible to a very limited extent. In some cases, data from non-EU countries are used. The collection of potential derogations and other arguments through public consultation is a process that is inappropriate for SMEs, especially considering the complexity of this PFAS restriction. Considering the complexity of this assessment, the number of potential actors involved, and the time needed to collect such data across the whole supply chain, industry can often not even make a full assessment nor provide all relevant input.
To make the restriction proposal workable, key actors across the supply chain must be involved in an appropriate and coordinated way.

We focus here on the use of synthetic peptides used as active ingredients in cosmetic industry.

Synthetic peptides are used as active ingredients in cosmetic industry, mainly in skin care market segment. A significant number of them are produced using solid-phase procedures. Due to cleavage and purification conditions, they are mostly obtained in the presence of trifluoroacetic acid (TFA), CF_3-COOH (EC / List no.: 200-929-3; CAS no.: 76-05-1).

The proposed restriction, which is the subject of the consultation, would ban the use of TFA (included in OECD definition for PFAS) in the manufacturing process of synthetic peptides for cosmetic use (#), and it would also ban placing on the market those synthetic peptides as cosmetic ingredients, and any cosmetic product formulated with such synthetic peptides, containing TFA as constituent or impurity (if TFA concentration is not under 25 ppb, as proposed).

We advocate for a 12 year derogation (after the general transition period of 18 months) for the above-mentioned use of TFA and those cosmetic ingredients and products containing it. We provide the following basis to support this derogation.

(#) Synthetic peptides may also be used in other sectors (human and veterinary medicinal products, cosmetics for pets, phytosanitary uses, etc.), but only human cosmetic applications are addressed in this comment.

Specific Information Requests

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In addition to an opportunity to provide general comments, as outlined above, the consultation includes the following specific questions to gather information that is considered to be particularly relevant to the evaluation of the proposal:

1. **Sectors and (sub-)uses**: Please specify the sectors and (sub-)uses to which your comment applies according to the sectors and (sub-)uses identified in the Annex XV restriction report (Table 9). If your comment applies to several sectors and (sub-)uses, please make sure to specify all of them.

   Sector: Cosmetics (Annex E.2.6)

   (Sub-)uses:

   a) Use of TFA in the manufacturing of synthetic peptides for cosmetic use. (TFA is used as a reagent in peptide synthesis for the cleavage and deprotection reactions, and as a co-solvent for the washing and purification steps).

   b) Use of synthetic peptides as cosmetic ingredients (containing TFA as constituent or impurity) in cosmetic formulations.

2. **Emissions in the end-of-life phase**: The environmental impact assessment does not cover emissions resulting from the end-of-life phase. To get a better understanding of the extent of the resulting underestimation, (sub-)use-specific information is requested on emissions across the different stages of the lifecycle of products, i.e. the manufacture phase, the use phase and the end-of-life phase. Please provide justifications for the representativeness of the provided information. In particular:

   a. Please provide, at the (sub-)use level, an indication of the share of emissions (as percentages) attributable to these three different stages. An indication of annual emission volumes in the end-of-life phase at sector or sub-sector level would also be appreciated.

   b. If possible, please provide for each (sub-)use what share of the waste (as percentages) is treated through incineration, landfilling and recycling. Please provide information to justify the estimates as well as information on the form of recycling referred to.

Emissions across the different stages of the lifecycle of synthetic peptides.

Manufacture phase: On average, the ratio of TFA used for the synthetic process of peptides is estimated to be 30 kg of TFA per kg of manufactured peptide (~20 liters TFA/kg; TFA density = 1.49 g/mL). It includes the industrial manufacturing and research scale productions.

At the end of synthetic path, at least 99% of TFA is treated as waste. The current standard waste management is incineration.

The annual emission volumes estimation is calculated with following data:

- 23 tonnes of peptides are produced in Europe in 2023 (see attachment "Doc0201_Euromonitor_EU Peptide Market Size_Forecast 2023-2027").

- from these, approximately 60% are obtained though synthetic process using TFA (see attachment "Doc0202_Estimation of peptide sequences with TFA").

- then, estimated yearly amount of TFA (treated as waste) at the end of synthetic peptide manufacture would be:

→ 23 tonnes of peptides produced in EU x 60% x 20 liters TFA/kg peptide x 1,49 g/mL x 99% to waste treatment = 407 tonnes of TFA treated as waste (industrial standard treatment is incineration)

This represents >99% of emissions of TFA in the lifecycle of synthetic peptides for cosmetic use, which are handled through waste treatment.

A maximum 1% of TFA is estimated to remain as impurity (some companies regard it as a counterion) in the synthesized peptide powder.

Use phase: The synthetic peptides are formulated into cosmetic products (either directly as peptide powder or in a commercial solution, both forms are used as cosmetic ingredients, usually in leave-on face and body care applications), with an estimated maximum percentage in finished cosmetics of 0.005% (= 50 ppm) of peptide.

Then, expected amount of TFA in the cosmetic product would be 0.00005% (= 0.5 ppm, or 500 ppb) at the most.

During the manufacturing of the finished cosmetic, no TFA emissions nor impact on environment is expected since all cosmetic ingredient is incorporated into finished cosmetic.

End of life phase: As mentioned, most of synthetic peptides are formulated into leave-on face and skin care applications. Eventually, these peptides (along with TFA impurities) would be rinsed-off by personal hygiene (impact on sewage water treatment) or discarded into domestic/municipal waste in the case of unused or expired cosmetic products.

In order to have an estimation of the maximum amount of TFA that could be released into environment in the end-of-life phase, we consider that all synthetic peptides produced for cosmetic use in EU, and formulated into cosmetic products, would have an environmental impact:

→ 23 tonnes of peptides (EU year production) x 60% x 1% TFA (maximum in peptide powder) = 138 kg TFA/year

This amount of TFA (0.14 t/y), compared to other estimated annual emissions in other sectors (see Table 1 in Annex XV restriction report) is among the lowest.

Furthermore, companies manufacturing synthetic peptides for cosmetic use could easily improve purification steps at the end of the manufacturing process (in relatively short- or medium-term), and thus the remaining amount of TFA in synthetized peptide powder could be much lower than 1%. **The total substitution of TFA in synthetic peptides would require years of R&D activity to achieve completeness** (see point 6).

- **Toxicological profile of TFA**

Regarding toxicological profile of the TFA, we want to emphasize that no significant risk can be associated to the release of traces of TFA during the use of finished cosmetic products.

a) As regards human toxicity:

According to the harmonised classification and labelling described in annex VI of CLP regulation, TFA, as an acid, is classified H314, Skin Corr. 1A.

It is also classified "Acute tox 4 - H332 – Harmful if inhaled" which is the lowest category for inhalation hazard and not relevant for the exposure considered under this scenario.

TFA does not meet classification criteria on repeated toxicity nor any CMR classification.

→ No toxicological concern can be associated to TFA at expected concentration in cosmetic products, considering, moreover, that TFA forms salts when released to terrestrial environment and surface water. TFA salts won't have the same hazardous properties as the acid form.

b) As regards the environment:

TFA is not biodegradable, but, considering its log K_{ow}, **the substance is expected to have a low bioaccumulation potential** [Log K_{ow} 0.79 (25°C) <4]. Same conclusion is pointed out in ECHA's restriction report Annex B.4.2.7.3.

(No bioaccumulation studies obtained from established experimental protocols are available for TFA.)

Regarding aquatic toxicity, TFA is classified H412, Aquatic Chronic 3, but, according to the tests available on ECHA website, there is no observed effect on fish (OCDE 210) nor Daphnia (OCDE 211) at the expected concentrations.

Moreover, ECHA does not list TFA as a substance of very high concern (SVHC) according to the toxicological data available in its website.

Based on worst-case exposure scenarios for salts of TFA, risks to mammals, to plants growing in soil and to aquatic organisms is currently considered *de minimis* (see attachment "Doc0203_SOURCES, FATES, TOXICITY, AND RISKS OF TRIFLUOROACETIC ACID AND ITS SALTS").

It is to be noted that EPA does not include TFA in the definition of PFAS, considering it as a "well-studied non PFAS" (see attachment "Doc0204_EPA_National PFAS Testing Strategy_Oct 2021", page 5).

3. **Emissions in the end-of-life phase**: With respect to waste management options, additional information is requested on the effectiveness of incineration under normal operational conditions (for different waste types, e.g. hazardous, municipal) with respect to the destruction of PFAS and the prevention of PFAS emissions.

As mentioned in point 2, the industrial standard treatment for mixtures of TFA with other organic solvents collected after peptide synthesis is incineration.

Of all the commonly applied solids treatment technologies, incineration offers the only possibility to completely destroy PFAS (see attachment "Doc0301_PFAS thermal destruction at water resource recovery facilities--A state of the science review").

4. **Impacts on the recycling industry**: To get an understanding of the impacts of the proposed restriction on the recycling industry, information is requested on:

a. The impacts that the concentration limits proposed in paragraph 2 of the proposed restriction entry text (see table starting on page 4 of the summary of the Annex XV restriction report) have on the technical and economic feasibility of recycling processes (together with a clear indication on the waste streams to which the described impacts relate).

b. The measures that recyclers would need to take to achieve the proposed concentration limits.

c. The costs associated with these measures.

Recycling of TFA at the end of peptide synthetic process is difficult since it is always found mixed with other organic solvents. No available info on recycling processes for these mixtures.

The current standard industrial waste treatment is incineration.

5. **Proposed derogations – Tonnage and emissions**: Paragraphs 5 and 6 of the proposed restriction entry text (see table starting on page 4 of the summary of the Annex XV restriction report) include several proposed derogations. For these proposed derogations, information is requested on the tonnage of PFAS used per year and the resulting emissions to the environment for the relevant use. Please provide justifications for the representativeness of the provided information.

   TFA use in peptide synthesis for cosmetics is not included in proposed derogations.

6. **Missing uses – Analysis of alternatives and socio-economic analysis**: Several PFAS uses have not been covered in detail in the Annex XV restriction report (see uses highlighted in blue and orange in Table A.1 of Annex A of the Annex XV restriction report). In addition, some relevant uses may not have been identified yet. For such uses, specific information is requested on alternatives and socio-economic impacts, covering the following elements:

   The use of TFA in the synthesis of peptides dedicated to the cosmetic industry has not been identified yet in the ECHA restriction proposal.

   Synthetic peptides used as cosmetic ingredients represent a significant market segment in face and body care applications. Although they are used in very low percentage in final cosmetic formulations, their importance as cosmetic active ingredients and the relative weight in the total raw material cost is quite remarkable.

   According to the current state of the art, it will be very difficult to synthesize peptides without TFA. Time will be necessary to find efficient new processes for all peptide sequences available on the market and for future ones (see point 6.e).

   So, we consider it is essential for our activity and business to obtain a time-limited derogation to find appropriate solutions.

   a. The annual tonnage and emissions (at sub-sector level) and type of PFAS associated with the relevant use.

      The PFAS associated with the relevant use is trifluoroacetic acid (TFA).

      As estimated in point 2, average annual tonnage of TFA for such use amounts to 411 tonnes (range tonnage may encompass 400 – 450 t/y). At least 99% of it is collected after peptide manufacturing process and this waste is currently treated by incineration.

      Only low TFA emissions in the end-of-life phase of cosmetic products are expected (see point 2).

   b. The key functionalities provided by PFAS for the relevant use.

      The key functionality of TFA is "Reactant/Co-solvent" in peptide synthetic process.

      It is used as a cleavage reagent in solid phase synthesis, both to cleave the peptide from its support and to deprotect the side functions of the amino-acid protective groups.

It can also be sparingly used in the context of liquid phase synthesis.

Both methods (solid + liquid) are being used in the chemical manufacture of peptides.

The peptide-TFA salt obtained after cleavage is exchanged to chloride or acetate to avoid the contact of TFA with the skin.

c. The number of companies in the sector estimated to be affected by the restriction.

A large number of peptide manufacturers and cosmetic companies using synthetic peptides would be affected.

According to some estimations from cosmetic sector, it is expected that the following companies would be affected if TFA is banned (making current synthetic peptide manufacturing not viable):

- ► 10-20 peptide manufacturing companies.
- ► 500-5000 companies formulating with synthetic peptides.
- ► Besides that, many other companies would be indirectly affected: distributers, packaging producers… cosmetic industry supports over 3 million jobs across Europe, up & down the value chain (see attachment "Doc0601_Socio-Economic Contribution of the European Cosmetics Industry_2022").

The ratio of cosmetic products formulated with synthetic peptides as cosmetic actives within skincare segment in Beauty & Personal Care, launched during the last 5 years (2018-2022) is around 4.2% (according to Mintel GNPD data: 5 745 cosmetic products marketed, containing as ingredients some synthetic peptides, from a total of 81 992 cosmetic products, including 60% factor for those obtained by synthetic process using TFA; see attachment "Doc0602_Mintel GNPD_Marketed Cosmetics with Peptides").

If we could extrapolate this percentage (4.2%) to the total volume of skincare cosmetic business in Europe during 2022 (€25.6bn, according to Cosmetics Europe, see attachment Doc0601), an estimated €1.08bn cosmetic business volume would be affected by the restriction of TFA.

d. The availability, technical and economic feasibility, hazards and risks of alternatives for the relevant use, including information on the extent (in terms of market shares) to which alternative-based products are already offered on the EU market and whether any shortages in the supply of relevant alternatives are expected.

So far there are no alternatives to the use of TFA as reactant in peptide synthetic process.

e. For cases in which **alternatives are not yet available**, information on the status of R&D processes for finding suitable alternatives, including the extent of R&D initiatives in terms of time and/or financial investments, the likelihood of successful completion, the time expected to be required for substitution (including any relevant certification or regulatory approvals) and the major challenges encountered with alternatives which were considered but subsequently disregarded.

No ubiquitous key alternatives exist for replacing the TFA in peptides synthesis for the moment. It needs to be adapted for all amino acids with their protecting groups and for most of the resins used in solid phase chemistry. So far, there is no technically feasible global substitution of TFA for such use in view.

Since the publication of ECHA restriction proposal for PFAS, some peptide manufacturers have started working on:

- ✓ Work on the purification steps in order to have a minimum content of TFA in the peptide obtained. But the 25-ppb threshold is an extremely low concentration. It seems not feasible to have less than 25 ppb of TFA in finished cosmetic products.
- ✓ Manufacturing processes without TFA. TFA is a convenient solvent, but it is perhaps possible to find other polar solvents that work. Peptide manufacturers are testing currently in R&D stage, more "greener" processes using other solvents instead of TFA. But these greener processes won't be applicable for the synthesis of all peptides or amino-acid sequences- Each sequence need to be tested. Another step to be checked will be whether the final price of these new types of processes will be relevant for the cosmetics market.

Several years are needed to peptide manufacturers to substitute TFA in the synthesis process of the different peptides.

The initial R&D work put into manifest that there are clear handicaps on the way. It foresees no easy substitution or finding an alternative suitable for every peptide synthesis. It will take a long time, in the case there is any possibility. For sure, no possible solution at all just after the general transition period of 18 months (for an expert approach in scientific peptide synthesis, see attachment "Doc0603_Confirmation that there is no current alternative to TFA for peptide synthetic process").

Only having an extended time-limited derogation (12-year) will enable further research and development to identify possible alternatives for each sequence. Even if such alternatives would be eventually found, finished cosmetic products manufacturers will have to repeat all stability, toxicology, safety testing (plus administrative work) (See the details in point 8).

f. For cases in which **substitution is technically and economically feasible** but more time is required to substitute:

No substitution feasible at this time without any research work for most of the peptide sequences.

i. the type and magnitude of costs (at company level and, if available, at sector level) associated with substitution (e.g. costs for new equipment or changes in operating costs);

Hiring of researchers to develop a replacement synthetic method for each peptide concerned at research and manufacture scale.

No need of new equipment would be necessary. No major change in the operating costs is expected.

ii. the time required for completing the substitution process (including any relevant certification or regulatory approvals);

Unknown; not less than 5 to 10 years to find out an alternative manufacturing process without TFA for each synthetic peptide currently used as a cosmetic ingredient.

iii. information on possible differences in functionality and the consequences for downstream users and consumers (e.g. estimations of expected early replacement needs or expected additional energy consumption);

No difference in functionality should be observed if TFA substitution is successful.

But, for cosmetics, according to Cosmetic product Regulation (EC) 1223/2009, all changes in the quality of the raw material *(process/stability/impurities)* have to be checked and the product information file have to be updated (See description below under point 8).

An increase in energy consumption may be anticipated as TFA is used at room temperature and some heating should be necessary for the alternative substitution.

iv. information on the benefits for alternative providers.

Unknown at this time.

g. For cases in which **substitution is not technically or economically feasible**, information on what the socio-economic impacts would be for companies, consumers, and other affected actors. If available, please provide the annual value of EU sales and profits of the relevant sector, and employment numbers for the sector.

Not fully explored yet.

7. **Potential derogations marked for reconsideration – Analysis of alternatives and socio-economic analysis**: Paragraphs 5 and 6 of the proposed restriction entry text (see table starting on page 4 of the summary of the Annex XV restriction report) include several potential derogations for reconsideration after the consultation (in [square brackets]). These are us toes of PFAS where the evidence underlying the assessment of the substitution potential was weak. The substitution potential is determined on the basis of i) whether technically and economically feasible alternatives have already been identified or alternative-based products are available on the market at the assumed entry into force of the proposed restriction, ii) whether known alternatives can be implemented before the transition period ends (taking into account time requirements for substitution and certification or regulatory approval), and iii) whether known alternatives are available in sufficient quantities on the market at the assumed entry into force to allow affected companies to substitute.

   A summary of the available evidence as well as the key aspects based on which a derogation is potentially warranted are presented in Table 8 in the Annex XV restriction report, with further details being provided in the respective sections in Annex E.

   To strengthen the justifications for a derogation for these uses, additional specific information is requested on alternatives and socio-economic impacts covering the elements described in points a) to g) in question 6 above.

   Potential derogation of TFA as reactant/co-solvent in peptide synthesis is not considered yet.

8. **Other identified uses – Analysis of alternatives and socio-economic analysis**: Table 8 in the Annex XV restriction report provides a summary of the identified sectors and (sub-)uses of PFAS, their alternatives and the costs expected from a ban of PFAS. More details on the available evidence are provided in the respective sections in Annex E.

   For many of the (sub-)uses, the information on alternatives and socio-economic impacts was generic and mainly qualitative. In particular, evidence on alternatives was

inconclusive for some applications falling under the following (sub-)uses: technical textiles, electronics, the energy sector, PTFE thread sealing tape, non-polymeric PFAS processing aids for production of acrylic foam tape, window film manufacturing, and lubricants not used under harsh conditions.

More information is needed on alternatives and socio-economic impacts to conclude on substitution potential, proportionality, and the need for specific time-limited derogations. Therefore, specific information (if not already included in the Annex XV restriction report or covered in the questions above) is requested on alternatives and socio-economic impacts covering the elements listed in points a) to g) in question 6 above.

Table 8 in the Annex XV restriction report, under 'Cosmetics (Annex E.2.6.)', Sector as a whole, it considers that "*in absence of new information to the contrary, our assumption is that PFAS can be replaced by other ingredients and do not have critical functions in cosmetics*", but the use of TFA as reactant in the synthetic process of peptides to be used as cosmetic ingredients is not taken into account. These are critical ingredients, and currently there are no alternatives to TFA to obtain them.

For cosmetic finished products:

The 12-year derogation would allow industry to develop replacement of the synthetic method for each peptide but is also essential to ensure that downstream users can meet their own requirements within this timeframe.

For instance, for cosmetic industry, once a synthetic method at manufacture scale is in place, several steps need to be considered:

- Assessing/validating the new quality of the raw material
- Relaunch stability/compatibility tests → for each formula
- Potentially: updating labelling
- Carrying out administrative work (update documents, PIF, etc.) → This remains time consuming, especially for SMEs with limited resources.

However, in the absence of derogation, and considering only the general transition period of 18 months defined in the draft documents, all cosmetic products containing synthetic peptides will have to be withdrawn from the market (estimated cost, based on MINTEL and Europe Cosmetics data: see point 6, about total cosmetic segment impacted)

Furthermore, having no time-limited derogation for this use of TFA, it would imply no guarantee of availability of suitable alternatives, and adding up the cost of R&D, testing, packaging, PIF (Product Information File for each cosmetic product), for new cosmetic formulations.

9. **Degradation potential of specific PFAS sub-groups**: A few specific PFAS sub-groups are excluded from the scope of the restriction proposal because of a combination of key structural elements for which it can be expected that they will ultimately mineralize in the environment. RAC would appreciate to receive any further information that may be available regarding the potential degradation pathways, kinetics or produced metabolites in relevant environmental conditions and compartments for trifluoromethoxy, trifluoromethylamino- and difluoromethanedioxy-derivatives.

TFA is not included among trifluoromethoxy, trifluoromethylamino- and difluoromethanedioxy-derivatives, and it is generally recognized as a very stable molecule and not biodegradable, although is expected to have a low bioaccumulation potential.

There are, though, some potential degradation pathways for TFA:

a) The major products of thermal decomposition of trifluoroacetic acid at 300–390° in silica and mild-steel vessels are carbon dioxide, difluoromethyl trifluoroacetate, carbon monoxide, and trifluoroacetyl fluoride. Decomposition is believed to proceed through elimination of hydrogen fluoride, followed by the formation of difluoromethylene (CF2), which largely adds to trifluoroacetic acid to give the difluoromethyl ester. Reaction orders for decomposition and formation of products are fractional and increase with temperature, suggesting that the decomposition is partly heterogeneous.

   Source: https://pubs.rsc.org/en/content/articlelanding/1967/j2/j29670000282#:~:text=The%20major%20products%20of%20thermal,carbon%20monoxide%2C%20and%20trifluoroacetyl%20fluoride

b) The environmental fate of trifluoroacetic acid (TFA) is poorly understood. There are no known abiotic sinks for TFA, and there is a controversy on its biological fate. To provide insight into the environmental fate of TFA, a long-term (90-week) study was conducted to assess its biodegradability in an engineered anaerobic reactor. Trifluoroacetic acid was found to be cometabolically degradable in an anaerobic environment. Biodegradation is a potential sink for trifluoroacetic acid and may limit its accumulation in the environment.

   Source: https://www.researchgate.net/publication/245336353_Biodegradability_of_Trifluoroacetic_Acid

c) Photoreductive defluorination of trifluoroacetic acid (TFA) in the aqueous phase by hydrated electrons

   Source: https://www.sciencedirect.com/science/article/abs/pii/S1385894721043023

d) Additional bibliographic references – TFA as an atmospheric breakdown product.

   Source: https://www.fluorocarbons.org/environment/environmental-impact/tfa-as-an-atmospheric-breakdown-product/

As mentioned in point 2, EPA does not include TFA in its definition of PFAS, and considers it as a "well-studied non PFAS" (see attachment "Doc0204_EPA_National PFAS Testing Strategy_Oct 2021", page 5)

10. **Analytical methods**: Annex E of the Annex XV restriction report contains an assessment of the availability of analytical methods for PFAS. Analytical methods are rapidly evolving. Please provide any new or additional information on new developments in analytics not yet considered in the Annex XV restriction report.

Analytical methods for the determination of TFA (not included in Annex E of the Annex XV restriction report):

► Usual TFA analysis is based on **HPLC**:

Application notes by SIELC technologies on TFA dosage by HPLC:
https://sielc.com/Compound-TFA-Trifluoroacetic-Acid

Detection: LOQ 0,1 ppm at best

► **Elimination and exchange of trifluoroacetate counter-ion from cationic peptides: a critical evaluation of different approaches**

S. ROUX and al. J. Pept. Sci. 2008, **14**: p354 DOI: 10.1002/psc

Techniques used: FT-IR spectroscopy; 19F-NMR; 1H-NMR

Detection: Semi-quantitative, no LOD or LOQ
(see attachment "Doc1001_JPeptSci2008v14p354")

► **Determination of counter-ions in synthetic peptides by ion chromatography, capillary isotachophoresis and capillary electrophoresis**
W. Mrozik and al. J. Pept. Sci. 2012, **18**: p192 DOI: 10.1002/psc.1436
Techniques used: ion chromatography; capillary electrophoresis; isotachophoresis
Detection: LOD: 0.06-0.10 µmol/ml (7-11ppb) LOQ: 0.13-0.29 µmol/ml (15-33 ppb)
(see attachment "Doc1002_JPeptSci2012v18p192")

▸ **Quantitation of Total PFAS Including Trifluoroacetic Acid with Fluorine Nuclear Magnetic Resonance Spectroscopy**
D. Camdzic and al. Anal. Chem., 2023, **95**: p5484 DOI :10.1021/acs.analchem.2c05354
Techniques used: 1H-NMR; 19F-NMR
Detection: 100ppb TFA detected by F19-NMR
(see attachment "Doc1003_AnalChem2023v95p5484SI")

About COSMED

COSMED is the French cosmetic association for SMEs, a non-profit seeking association with more than 1000 members, in France and Europe. Cosmed sit at the European Commission as the voice of cosmetic SMEs.
COSMED is involved in the development of cosmetic regulations, as well as in national and international standardisation bodies. In this way, COSMED contributes to the development of a regulatory framework for the marketing of safe and effective cosmetic products.

Aix en Provence,

25 September 2023