Chlorate

contaminant or residue ?

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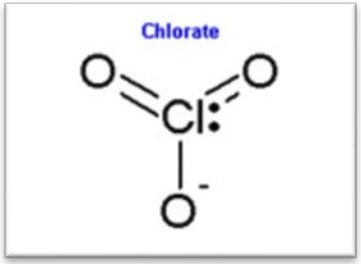
chemical structure of chlorate

- Salt of chloric acid $HClO_3$
- Chlorates are both herbicidal and biocidal substances
- Absorbed into the plant via the roots and stored



- Chlorate reversibly inhibits the absorption of iodide in the thyroid gland and can be particularly effective in sensitive groups such as children and pregnant women or people with thyroid dysfunction→ can cause undesirable health effects.
- Can afflict damage to the erythrocytes (methaemoglobin formation, hemolysis)

Occurence

- The chlorination of drinking water usually takes place within the framework of drinking water treatment to ensure the hygienic requirements

→ (In December 2017, a maximum value of 70 µg/L chlorate for long-term use and for drinking water treatment was set in Germany; 200 µg/L chlorate for temporary dosing if disinfection cannot be guaranteed otherwise)

Occurence

- In the past through the use of commercially available fertilizers (Sodiumchlorate, Potassiumchlorate)
- Pollution from the environment (contaminated irrigation or irrigation water, contaminated soil)
- Chlorine dioxide against pathogens on food or desinfectant for drinking water
- Residues of extraction, including treatment methods in agriculture, manufacturing, processing, preparation or treatment of products

Occurence

- Statistics recorded by the CVUA in Stuttgart

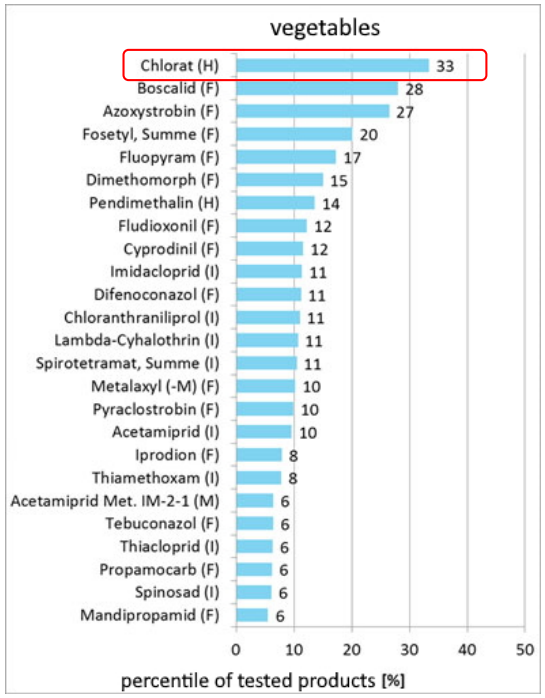


Table 1:Proportion of chlorate findings in comparison to other active substances on vegetables

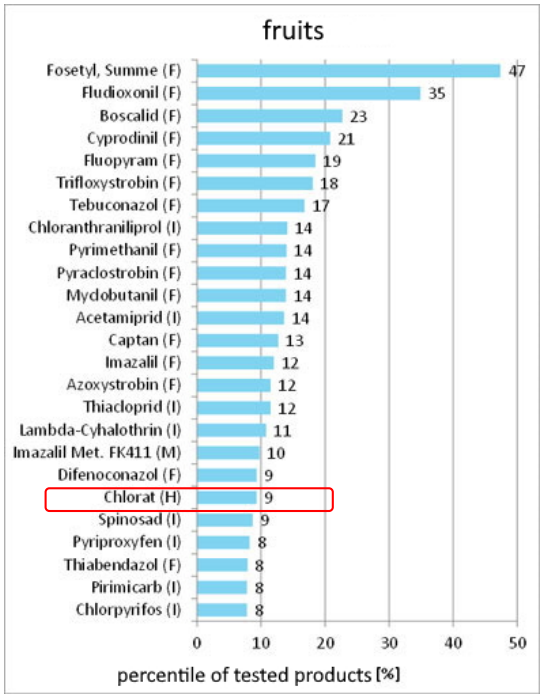


Table 2:Proportion of chlorate findings in comparison to other active substances on fruits

Ranking of pesticide findings in fruits and vegetables sorted according to the frequency of findings above the detection limit

Occurence

- Statistics recorded by Labor Dr. Lippert GmbH

Product	[%]
Herbs	28%
Carrots	15%
Salad	12%
Lamb's lettuce	9%
Spinach	7%
zucchini	6%
Melon	6%
Cucumber	4%
Tomato	3%
Mushrooms	2%
Peppers	2%
Kohlrabi	2%
Aubergine	2%
Celery	2%
Radish	1%
Strawberry	1%

Table 3:Proportion of chlorate findings on different matrices

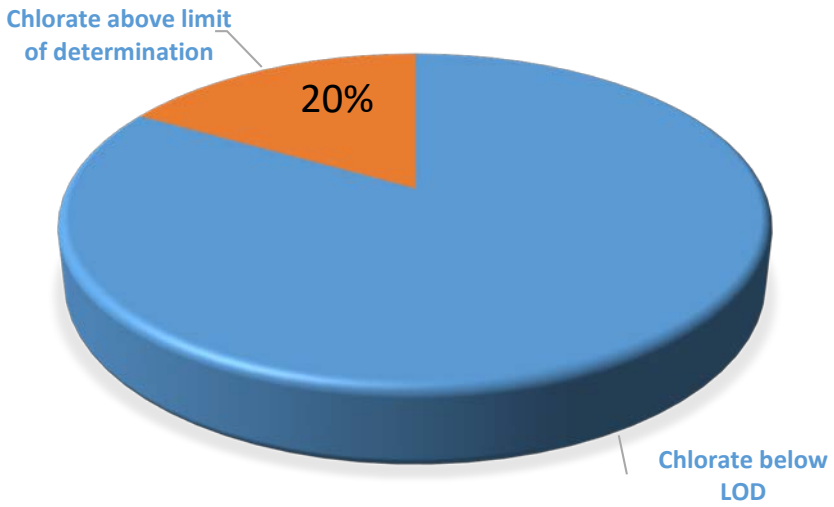


Chart 1:Percentage of chlorate findings above the limit of determination in comparison with total number of analysis

Evaluation regarding MRL

- Since 2008, the EU no longer permits the use of chlorates as active substances in plant protection or biocidal products
  - → MRL (Maximum residue limit) was set at 0,01mg/kg for chlorate as an active substance (EU.Reg.396/2005)
- The European Food Safety Authority (EFSA) has been involved in chlorate risk assessment for several years.

Evaluation regarding MRL

- Currently (January 2020), it seems the discussion is finally coming to an end
- Plans to set specific maximum residue levels (MRLs) for chlorate in the framework of Regulation (EC) 396/2005
    - → Otherwise the value of 0.01 mg/kg will apply for future assessments
    - → Problems for almost all products (mainly vegetables)

- The discussion in the final phase before the regulation is made public. New MRLs are expected to be valid in the coming weeks.

Development in the future

- The analysis of chlorate will become more important with the use of the new maximum residue values
- Many products that were previously classified as marketable after an analysis could no longer be permitted due to the incorporation of chlorate as a plant protection product
- Producers may need to analyze their chlorate entry pathways to prevent excessive loading of their products

Sources

- Eintrittswege von Chlorat in Pflanzen; Landinfo 4; Infodienst Landwirtschaft – Ernährung Baden Württemberg; 2015
- Chlorat und Perchlorat in pflanzlichen Lebensmitteln; Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit; 2014
- Rückstände und Kontaminanten in Frischgemüse aus konventionellem Anbau; CVUA Stuttgart; 2018
- Rückstände und Kontaminanten in Frischobst aus konventionellem Anbau; CVUA Stuttgart; 2018
- Draft Regulation as regards to maximum residue levels for chlorate in or on certain products SANTE 1084-2015 Rev.8; European Commission; 2019