

# Food contact materials and their chemical risk for the consumer's health

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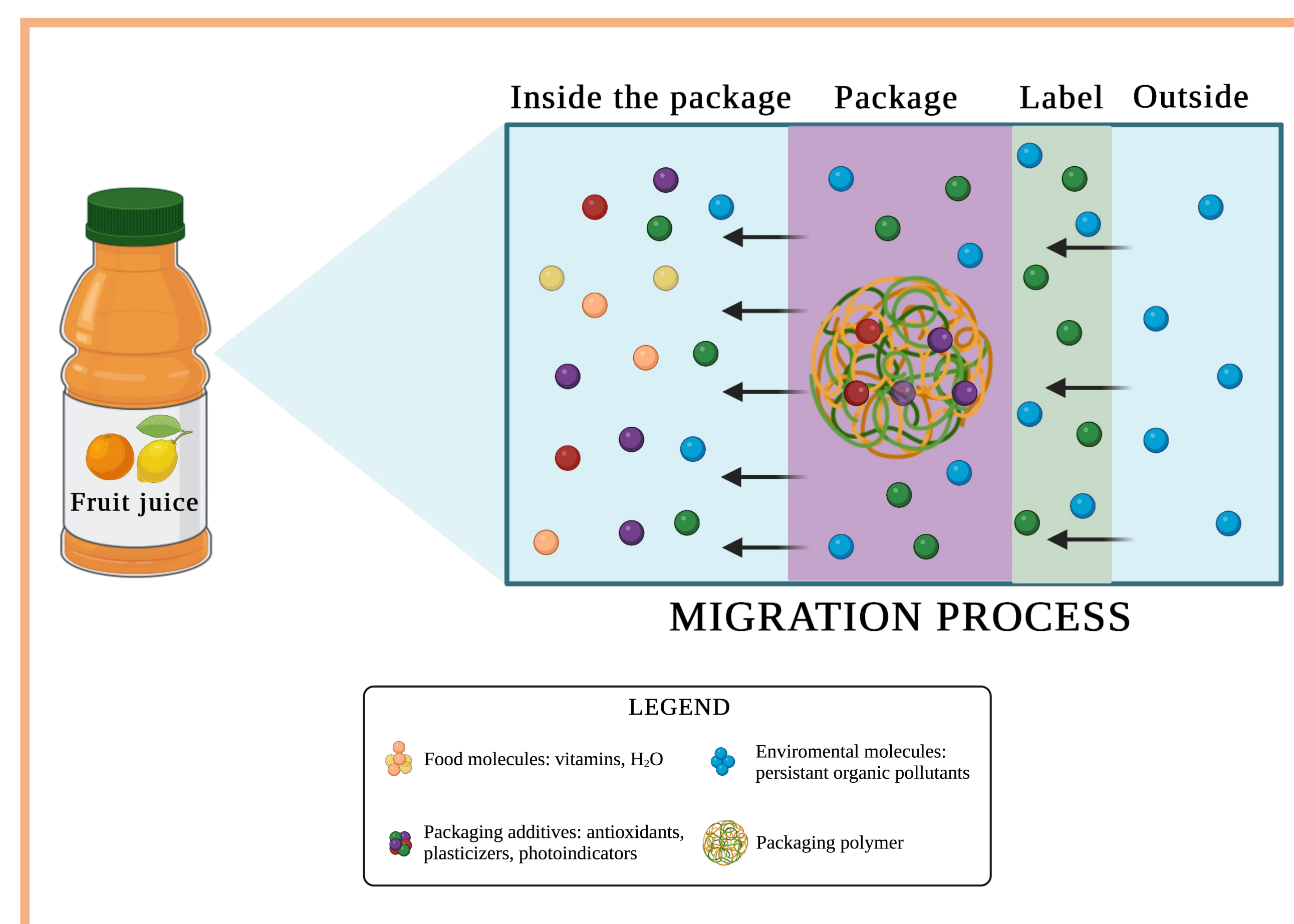
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## INTRODUCING THE MIGRATION PROCESS

Migration is a **complex process** that includes **diffusion**, **dissolution**, and **equilibrium**, and it is improved by different **pre-treatments** such as sterilization, irradiation or microwave heating. There are different parameters affecting the level of migration, such as **molecular weight of additives**, the **type of molecule** incorporated, or the **temperature and time of exposure** of different pre-treatments.

In this way, **low molecular weight and lipophilic nature of plasticizers and antioxidants** make easier their migration, especially in high fat content foods.

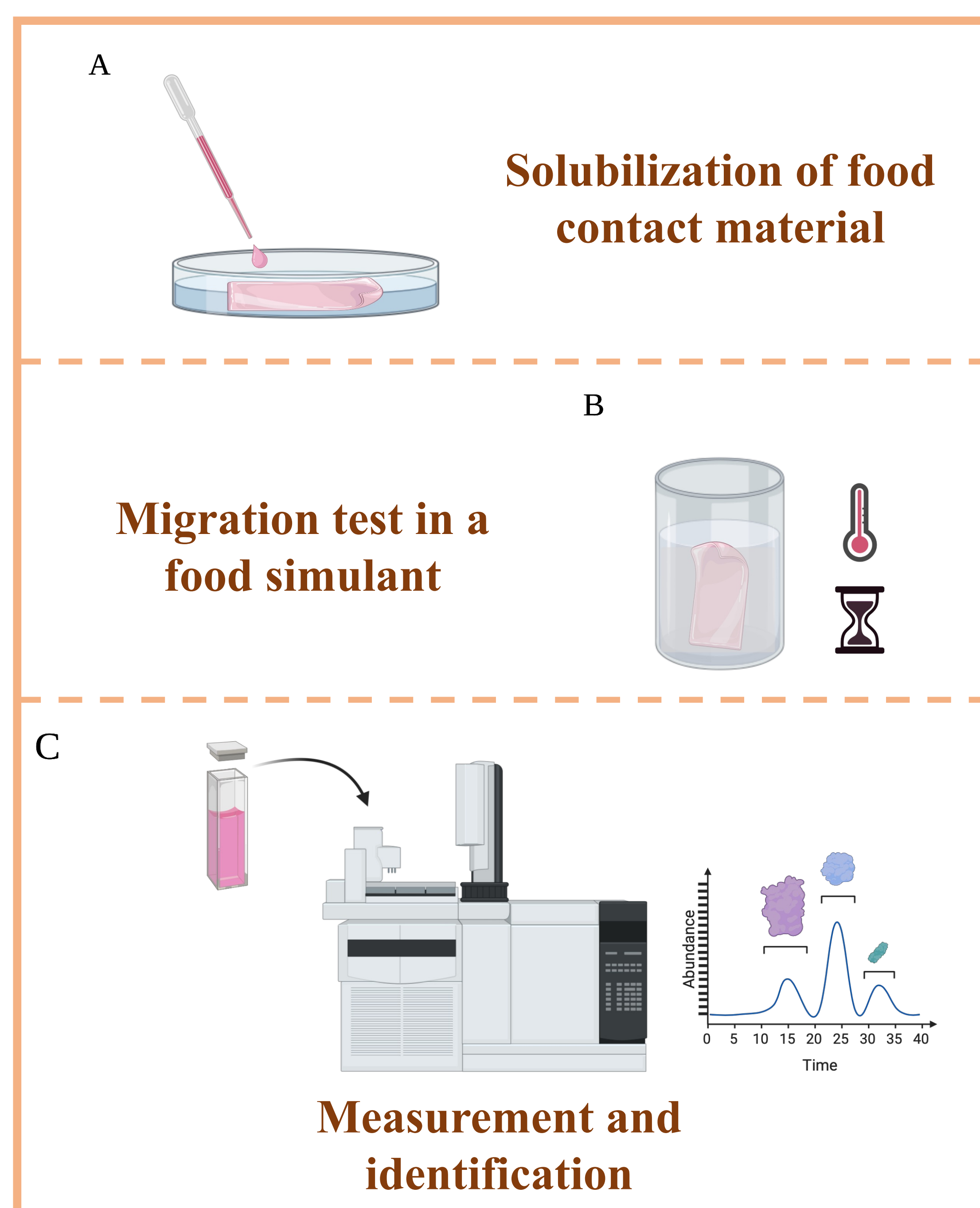
Moreover, **higher temperatures** are related to **higher migration levels**. This is related to the **free volume theory**, that explains how the **molecular motion energy** is increased with temperature, leading to a higher polymer chain fluidity and, therefore, to an expansion of the free space of the molecule.



## IDENTIFICATION OF THE COMPOUNDS MIGRATED

Since different compounds present in food packaging materials have been related with some **toxicity activities**, it is necessary to **analyze and identify** the presence of these compounds in food due to migration phenomena.

In this way, **GC/MS**, **GC/MS X GC/MS/TOF-MS**, **GCXGC/TOF-MS**, **UPLC/QTOFMS**, and **GCQ-Orbitrap MS** are usually applied for the identification of NIAS, being **GC/MS** widely used because of its **sensitivity** and **accessibility** in routine control analysis.



**Silico tools** has been suggested as cost-effective and throughout identification predictors. They are used for both **toxicology and ecology prediction** of physicochemical behavior of compounds.

Furthermore, silico tools are used to **understand the effect of chemical compounds on the humans' health and the environment**.

Silico tools provide a screening of a large number of compounds, complementing **in vivo and in vitro** test results.

## CONCLUSIONS

- ➡ The migration of these molecules from package to food is a **general concern** since some of them are **related with toxicological activities**
- ➡ **GC/MS** is the identification equipment more commonly used for its **high sensitivity**, while the main advantage of **in silico tools** is the **wide spectre of compounds that can screen**.
- ➡ It is important to consider the **underestimation of chemicals' migration** when **food simulants** are used in testing.

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