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How is the Amber Color Produced in the Polypropylene and Glass Autosampler Vials - INTERNAL ONLY

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Amber coloration in autosampler vials is achieved through the use of either **organic or inorganic pigments and dyes**, depending on the vial material.

🔬 Glass Vials

- **Colorant:** Iron oxide (Fe_2O_3)
- **Concentration:** Typically **<1%**
- **Type:** *Pigment* (insoluble, suspended in the glass matrix)

🧪 Polypropylene (Plastic) Vials

- **Colorant:** Proprietary **organic compound**
- **Concentration:** Typically **<0.1%**
- **Type:** *Dye* (soluble in the polymer substrate)
- **Note:** No iron content, making these vials suitable for **Ion Chromatography (IC)** applications.
- At concentrations **>2%**, the vial becomes **fully opaque**.

🧴 Purpose of Amber Color

Amber vials are used to protect **light-sensitive compounds** from photodegradation.
For example, **folic acid** is prone to **photo-oxidation**, which can compromise analytical accuracy if exposed to ambient light.

🎨 Pigments vs. Dyes – Key Distinction

- **Pigments**: Insoluble, suspended in the material (e.g., iron oxide in glass)
- **Dyes**: Soluble, integrated into the material (e.g., organic dye in polypropylene)

🥽 Additional Notes on Glass Coloration

A variety of colors can be produced in glass depending on the additive:

- **Green**: Iron oxide + chromium compounds (e.g., wine bottles – *Fig. 1*)
- **Turquoise**: Copper-based compounds (e.g., *Egyptian Blue* – *Fig. 2*)
- **Deep Blue**: Cobalt compounds (e.g., ancient Chinese porcelain – *Fig. 3*)

- **Tyndall Effect**: Some glass coloration arises from **light scattering**, not pigments or dyes.

📸 *Refer to images below for visual examples of coloration in historical and modern glass applications.*

Fig. 1. Coloration in wine bottle

Fig. 2. Example of Egyptian Blue in an ancient artifact

Fig. 3. Cobalt used in Chinese porcelain.

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