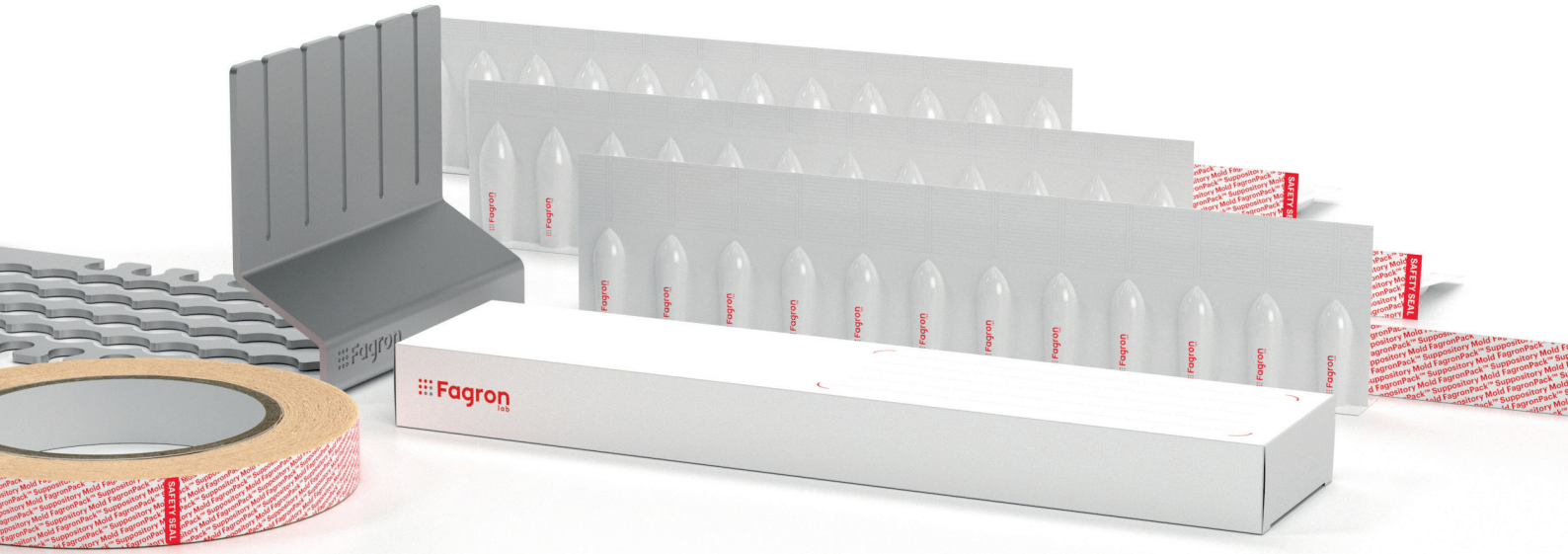

FagronLab™ Suppository Solution

All-in-one solution for suppository preparation

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Contents

1. Introduction

Suppositories are semi-solid dosage forms that are intended for rectal application. They are formulated to soften, melt, and dissolve at a slightly lower temperature than the body's temperature (around 35°C). Through this mechanism, they can generate local effects or release substances into the bloodstream, thereby generating local or systemic effects. Pharmacopeias and Good Manufacturing Practice (GMP) guidelines provide comprehensive guidance on creating ideal conditions for formulation preparation, selecting appropriate equipment, and employing effective packaging methods. Figure 1 shows the compounding procedure of suppositories following the guidelines outlined in the United States Pharmacopeia (USP)[1].

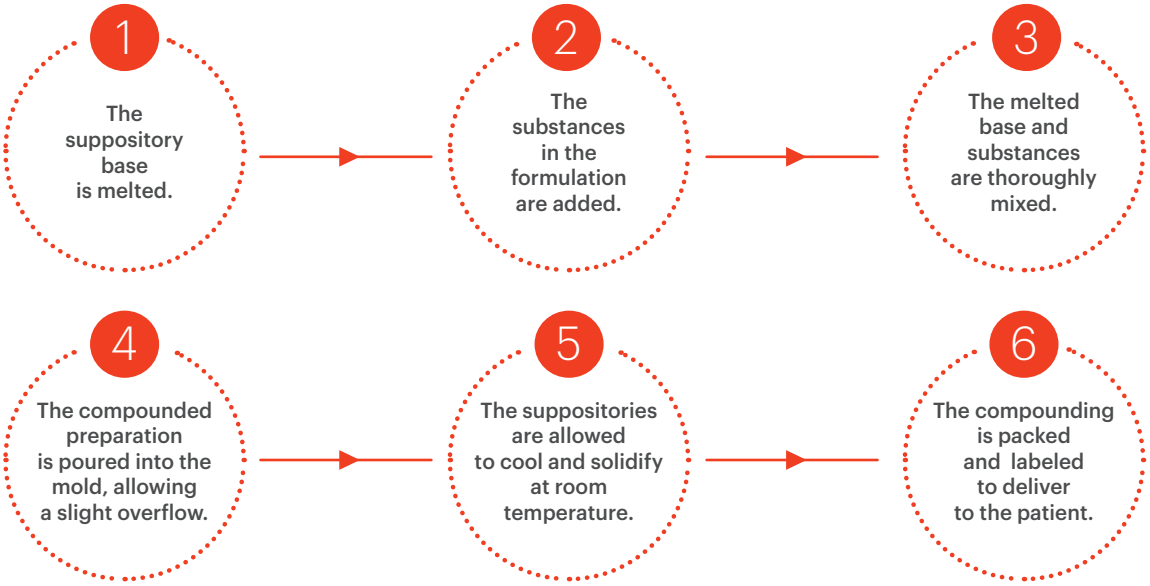

Figure 1. Compounding procedure of the suppositories.

To ensure the integrity of suppositories prepared using traditional brass molds, it is crucial to grease molds with paraffin before pouring the compounding and exercising caution during mold opening. Pouring the suppositories into an ungreased mold, allowing them to solidify in the fridge rather than at room temperature, or opening the mold carelessly can result in suppository breakage. To prevent any loss of quantity caused by suppository breakage during mold opening, an additional 10% more suppositories than prescribed are prepared. However, this approach uses more materials than necessary and is not a cost-effective method.

1.1. GMP Compliance of Compounded Suppositories

Sustaining the quality of the suppositories depends on the preparation process and involves proper packaging, transportation, and storage under specified conditions. Commercial suppository medications adhere to the GMP requirements[2] in Figure 2 through the use of single-pack units. This packaging is resistant to air, humidity, and light, as well as being tear-resistant. Conversely, traditional packaging methods like aluminum foil wrapping and jar placement for compounded suppositories might not align with GMP's optimal conditions. While aluminum foil provides a barrier, its susceptibility to tearing poses a contamination risk. This can compromise quality and safety, especially regarding hygienic concerns. Placing suppositories in jars demands careful temperature considerations, as exceed-

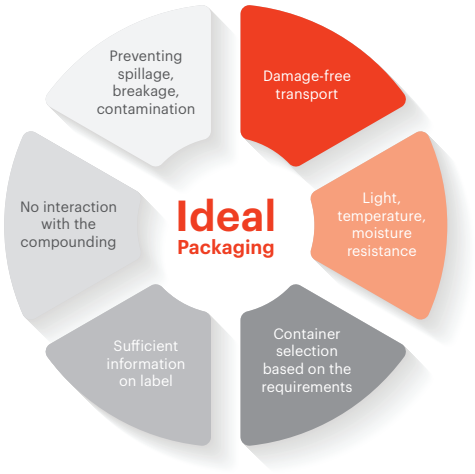

Figure 2. Characteristics of an ideal packaging according to GMP.

ing 35°C can alter their shape. The USP underscores qualifying drug containers based on labeled conditions and environmental factors, considering seasonal variations and transportation specifics.[5]

A more recent approach to packaging compound suppositories involves using disposable suppository molds. These molds resemble commercial single-pack units but necessitate an alternative solution for sealing the open lid. Although pharmacies commonly use aluminum foil for sealing, this method poses environmental concerns and a risk of tearing. Alternatively, some pharmacies invest in equipment for heat pressing to seal the lids. Still, there's a potential risk of shape deformation due to softening or melting during the heat application.

2. FagronLab™ Suppository Solution

Acknowledging the challenges mentioned above, there is a requirement for a novel packaging solution to guarantee GMP and pharmacopoeia compliance for compounded suppositories and protect them against both contamination and deformity. In response, **FagronLab™** has developed **Suppository Solutions**. Promoting disposable single-pack units, as recommended by USP[3], this product line encompasses versatile tools aimed at streamlining the compounding process, saving time, and ensuring compounding quality until administration and primary package cleanliness during storage. The objectives extend to ensuring hygienic suppository application and promoting patient treatment adherence. The line comprises four exclusive products, detailed in Figure 3 for reference.

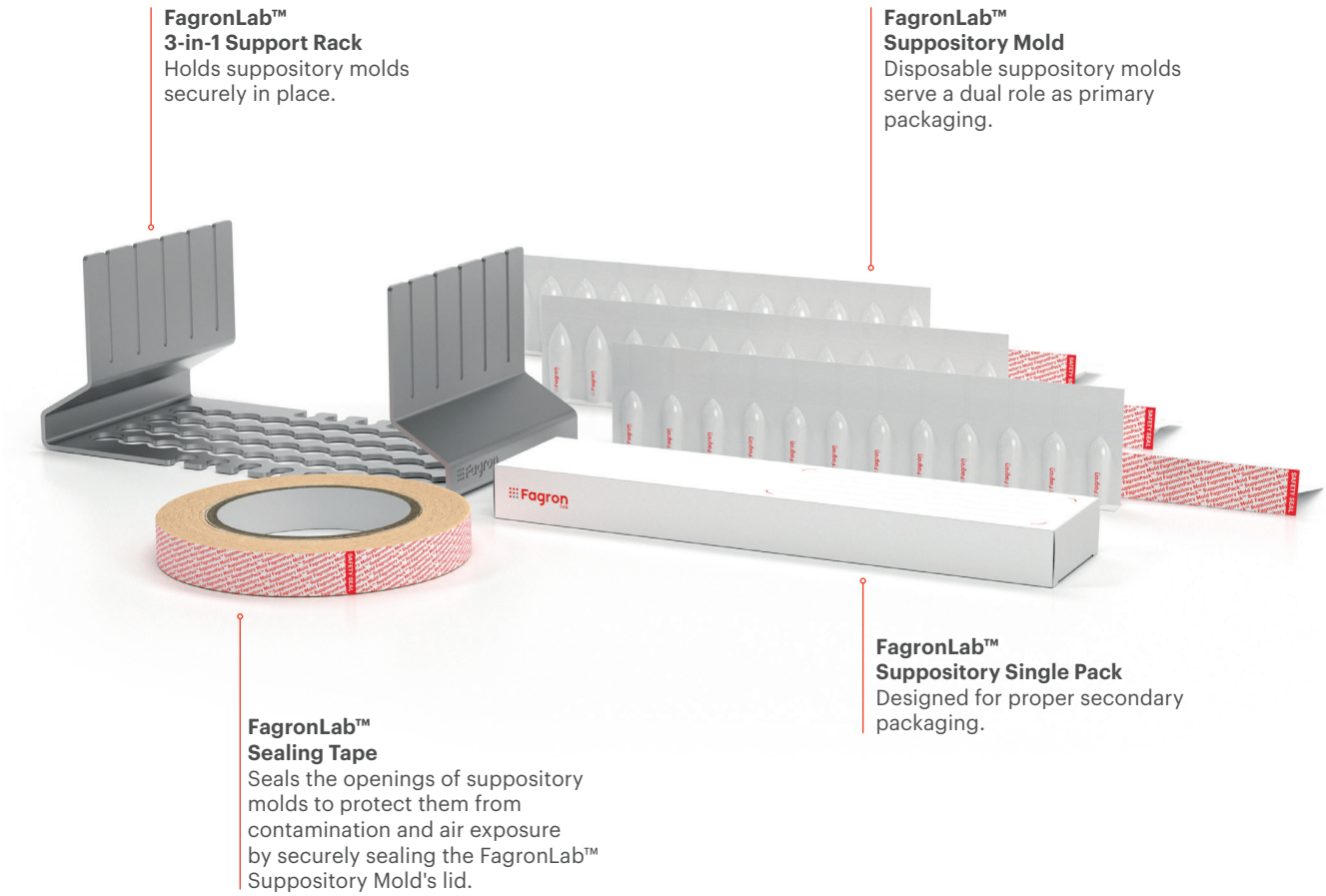

Figure 3. Overview of the FagronLab™ Suppository Solution.

Each product within the **FagronLab™ Suppository Solution** line serves a specific role, addressing various process stages, from suppository molding to patient delivery. The sequence for utilizing these products during the suppository filling process is illustrated in Figure 4.

1. Mold 2. Seal 3. Pack

Figure 4. Compounding suppositories with the FagronLab™ Suppository Solution.

2.1. FagronLab™ 3-in-1 Support Rack

The **FagronLab™ 3-in-1 Support Rack** is developed to assist pharmacists in compounding inserts, suppositories, and eyedrops by ensuring their secure positioning (Figure 5). It simplifies the compounding process, promoting a clean and well-organized workspace. It accommodates up to 5 strips, including 10-cell and 12-cell varieties, enabling the simultaneous preparation of up to 60 inserts. When inverted, it securely holds up to 2 strips of FagronLab™ Monodose, equivalent to 10 droppers. The **FagronLab™ 3-in-1 Support Rack** is heat-resistant and autoclave-safe, ensuring suitability for versatile use. Additionally, it can be conveniently cleaned in a dishwasher with commercial detergents or disinfected using ethanol and isopropanol.

The **FagronLab™ 3-in-1 Support Rack** is made from anodized aluminum, which adds a protective layer that enhances its quality and durability. This layer also makes the rack more resistant to external factors, such as corrosion, wear, and scratches[5-9]. Furthermore, this material is environmentally friendly due to its minimal energy requirements during manufacturing. Additionally, the most common byproducts of anodizing, such as aluminum hydroxide and aluminum sulfate, are recyclable materials[9-10].

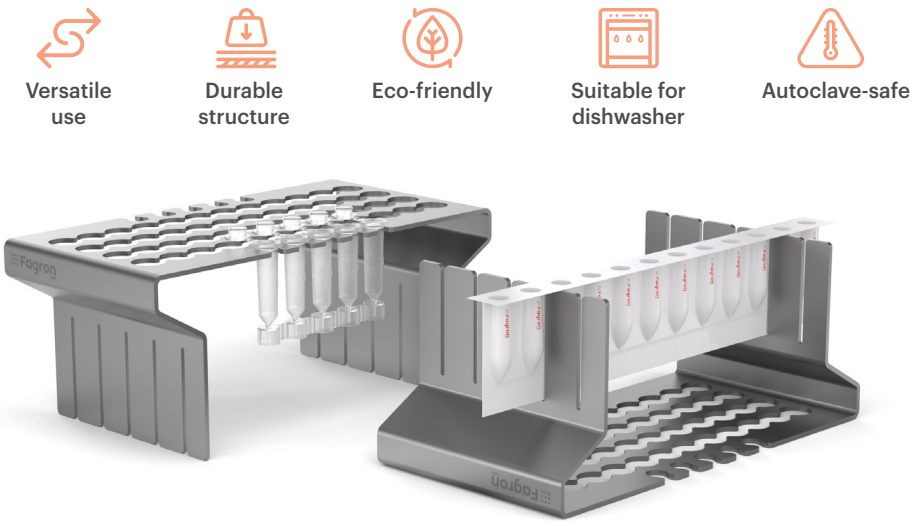

Figure 5. The usage of the FagronLab™ 3-in-1 Support Rack.

2.2. FagronLab™ Suppository Mold

Aligned with the USP's suggestion to employ disposable equipment for contamination risk reduction[3], the **FagronLab™ Suppository Mold** is a versatile disposable mold used for shaping suppositories and vaginal inserts, also serving as their primary packaging. This dual purpose eliminates the necessity to open the molds after the suppositories solidify, reducing the risk of insert breakage and contamination risk during packing. This saves time by eliminating additional primary packaging steps, ensures the maintenance of compounding quality, and fulfills the requirement for suitable primary packaging for these dosage forms. The product, composed of PVC (Polyvinyl Chloride) and PVDC-based (Polyvinylidene Dichloride) material, is a barrier to prevent suppositories from coming into contact with water vapor, gases, and chemicals. This barrier function ensures compliance with GMP[11-12] and pharmacopeias[2-5,13-16] for compounding.

The **FagronLab™ Suppository Mold** is available in 3 g, 2 g, and 1 g forms, presented in strips, with each strip containing 12 cells.

These cells are tear-resistant and can be separated from each other along marked tear lines (Figure 6). This feature enables pharmacists to effortlessly customize the mold's cavity based on the desired quantity of suppositories to be prepared. It also facilitates the transportation of the exact number of cells required by the patients' treatment regimen, ensuring a convenient journey.

Delivered in a well-designed box secured with a protective, resealable bag, the **FagronLab™ Suppository Molds** are protected during transportation and storage from contamination and UV-light exposure. This packaging design adheres to the USP's recommendation[3] for clean equipment storage to minimize contamination risks and contributes to keeping the shelf organized (Figure 6). The box is user-friendly, featuring an open side that allows easy access to the suppository molds. Furthermore, vital product information is conveniently placed on the box's edges, enabling a swift content check without needing to remove it from the shelf, ultimately saving time.

Figure 6. The box and the tear lines between 2 cells of FagronLab™ Suppository Mold.

2.3. FagronLab™ Suppository Sealing Tape

Designed as a complementary accessory, the **FagronLab™ Suppository Sealing Tape** safeguards suppositories and vaginal inserts from contamination and air exposure by securely sealing the **FagronLab™ Suppository Mold**'s lid (Figure 7). This sealing action preserves compounding quality and ensures a hygienic suppository application. The **FagronLab™ Suppository Sealing Tape** is presented in pre-cut sealing labels that match the length of the **FagronLab™ Suppository Mold**, eliminating the need for manual measurements and cuts. Thanks to the ingenious box design, the paper labels can be effortlessly peeled off by pulling the carrier tape. Instructions for this process are in Figure 8 and conveniently provided on the box for reference. This feature contributes to time savings in the lab.

The **FagronLab™ Suppository Sealing Tape** is made from a paper-based material that makes it an eco-friendly product and facilitates tear-away when separating inserts and suppositories. Furthermore, the adhesive material complies with FDA and EU regulations, assuring its safety for human consumption.

The safety analysis tests were performed by following the procedures outlined in these European Standards below:

- **EN 1186**: This standard outlines specific requirements for testing and evaluating the migration of certain substances from the material to the food[17].
- **EN 13130**: Similar to EN 1186, EN 13130 focuses on the specific migration of certain chemical elements from materials and articles intended for contact with food[18].
- **CEN/TS 14234** and **CEN/TS 14235**: These are technical specifications (TS) within the European Committee for Standardization (CEN) system. CEN/TS 14234[19] and CEN/TS 14235[20] deal with materials and articles in contact with foodstuffs, specifically plastics or polymer coatings. Technical Specifications are documents that provide a set of guidelines or requirements for specific materials or products.

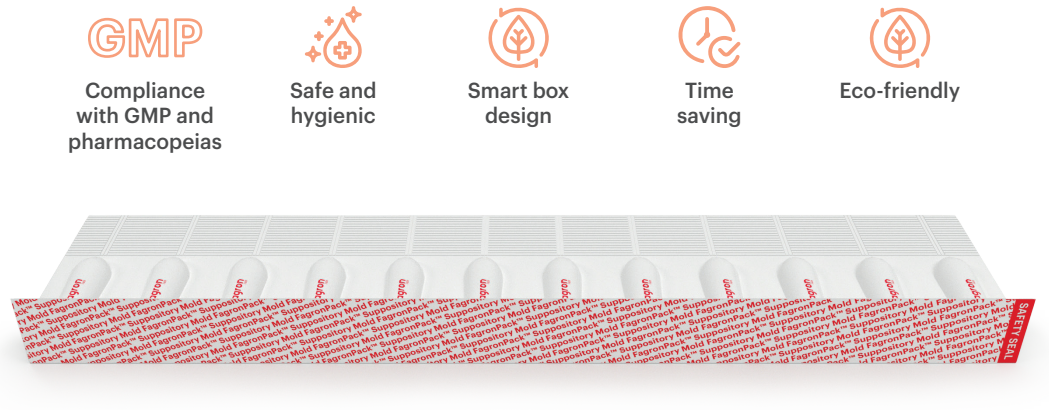

Figure 7. A Sealed FagronLab™ Suppository Mold with the FagronLab™ Suppository Sealing Tape.

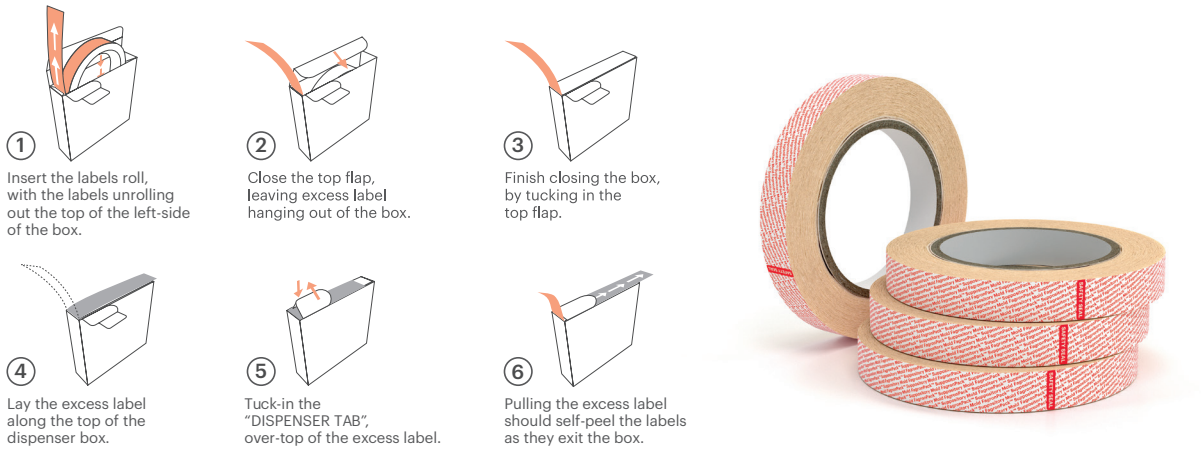

Figure 8. The pulling mechanism of the FagronLab™ Suppository Sealing Tape

2.4. FagronLab™ Suppository Single Pack

A dedicated secondary packaging, the **FagronLab™ Suppository Single Pack** (Figure 9), has been specifically created to deliver suppositories to the patient. This convenient packaging offers a dedicated space for writing application details and compounding specifications to prevent medication misuse

Figure 9. FagronLab™ Suppository Single Pack

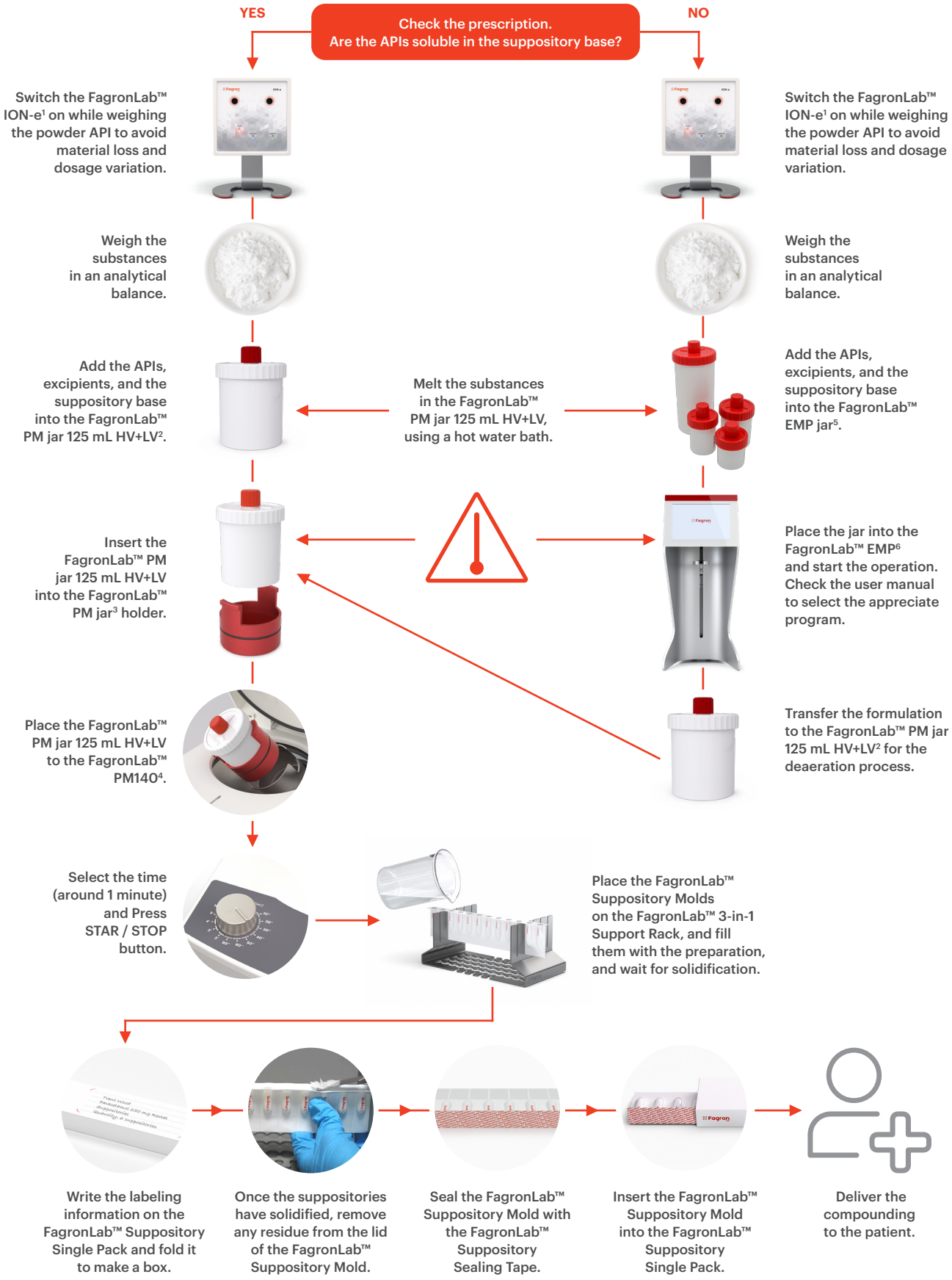

Figure 10. The entire process of suppository preparation.

[1] FagronLab™ ION-e: Ionizer which used to neutralize electrostatic charge of the powders to eliminate powder adhesion.
[2] FagronLab™ PM jar 125 mL HV+LV: A sterile and disposable mixing jar designed for the FagronLab™ PM140.
[3] FagronLab™ PM jar holder: A jar holder that securely holds the FagronLab™ PM jars during high-speed operation of the FagronLab™ PM140.
[4] FagronLab™ PM140: An all-in-one solution combining mixing, wet milling and deaeration in a single-step. In this process, it is used for mixing and deaerating the compounding formulation.
[5] FagronLab™ EMP jar: A disposable mixing jar dedicated for the FagronLab™ EMP devices. It is not compatible with the FagronLab™ PM140.
[6] FagronLab™ EMP: Patented electronic mortar and pestle technology for mixing and dispensing the APIs in the base. Available in automatic, semi-automatic, and manual versions. For enhanced compounding quality, it is advisable to use the FagronLab™ PM140 for post-operation deaeration, effectively eliminating entrapped air.

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