Invomatic – Designing Your Mixing Program

Selecting the Correct Container Size and Shape:

- Never fill the container more than 70% full of powder (50% is ideal)
- Do not use a thin container, jars must be appropriately sized to allow the mixing spheres to move freely throughout the mixture
- Do not use a container with a textured inside as this could trap powder and prevent homogenous mixing
- The largest size jar that can fit on the Invomatic is the 1L jar
- Depending on powder density, the maximum quantity that can be mixed at a time is approximately 500-700 grams in a 1000mL jar

Selecting the Correct Mixing Sphere Size:

- The medium mixing spheres are best for just mixing powders of similar particle size – the use of three or four per batch is recommended
- The larger mixing spheres work well for trituration of gritty powders - just two to three of these heavier mixing spheres is typically sufficient
- The small mixing spheres may be considered for small quantities of powder (50g or less) – the use of three or four per batch is recommended

Selecting the Correct Mixing Speed and Time:

- Comparisons between mixing speeds of 10, 50, and 100rpm suggest that faster mixing speeds (100rpm, or, 100% speed) are superior to slower mixing speeds across most formulations
- Comparisons between mixing times of 2, 5, 8, and 10 minutes suggest that longer mixing times (5-10 minutes) are superior to shorter mixing times across all formulations

Validated Mixing Protocols:

API	Formulation	Mixing Parameters	Notes
Copper chelate[1]	Copper chelate 1mg, magnesium citrate 150mg, zinc chelate 250mg in Celulomax HG (Size 00) -30ea	**Time**: 5-8 minutes **Speed:** 100rpm **Spheres:** 4 medium **Jar Size**: 100g jar size – 30cap	2.5-2.88% RSD from 10 replicate samples of compounded capsules
Finasteride[1]	Finasteride 1mg in Celulomax HG (Size 4) -30ea	**Time**: 8 minutes **Speed:** 100rpm **Spheres:** 4 medium **Jar Size**: 100g jar size – 30cap	0.88-2.66% RSD from 10 replicate samples of compounded capsules
Folic acid[1]	Vitamin B12 5mg, folic acid	**Time**: 5-8 minutes	3.4-3.6% RSD from 10

	50mg Celulomax (Size 3) – 30ea	**Speed:** 100rpm **Spheres:** 4 medium **Jar Size**: 100g jar size – 30cap	replicate samples of compounded capsules
Levothyroxine sodium	Levothyroxine sodium 1:1000 dilution in SimpleCap or DiluCap SLD	**Time**: 5-8 minutes **Speed:** 100rpm **Spheres:** 4 medium **Jar Size**: 16oz ointment jar – 100g total for mix	2.35% RSD with top, middle, and bottom sampling of mixture -Evaluation performed at an independent FDA registered lab
Liothyronine sodium	Liothyronine 1:1000 dilution in SimpleCap or DiluCap SLD	**Time**: 10 minutes **Speed:** 100rpm **Spheres:** 4 medium **Jar Size**: 16oz ointment jar – 100g total for mix	4.62% RSD with top, middle, and bottom sampling of mixture -Evaluation performed at an independent FDA registered lab
Magnesium citrate[1]	Copper chelate 1mg, magnesium citrate 150mg, zinc chelate 250mg in Celulomax HG (Size 00) -30ea	**Time**: 10 minutes **Speed:** 100rpm **Spheres:** 4 medium **Jar Size**: 100g jar size – 30cap	1.8 -4.8% RSD from 10 replicate samples of compound capsules
Naltrexone HCl	Naltrexone 10mg/g in SimpleCap	**Time**: 6 minutes **Speed:** 100rpm **Spheres:** 4 medium **Jar Size**: 16oz ointment jar – 100g total for mix	2.88% RSD with top, middle, and bottom sampling of mixture - Evaluation performed at an independent FDA registered lab
Progesterone	Progesterone (micronized) 100mg/g in SimpleCap	**Time**: 10 minutes **Speed:** 100rpm **Spheres:** 3 medium **Jar Size**: 16oz ointment jar – 100g total for mix	5.72% RSD with top, middle, and bottom sampling of mixture -Evaluation performed at an independent FDA registered lab
Vitamin B12[1]	Vitamin B12 5mg, folic acid 50mg Celulomax (Size 3) – 30ea	**Time**: 5-8 minutes **Speed:** 100rpm **Spheres:** 4 medium **Jar Size**: 100g jar size – 30cap	2.07 -2.3% RSD from 10 replicate samples of compound capsules
Zinc chelate[1]	Copper chelate 1mg, magnesium citrate 150mg, zinc chelate 250mg in Celulomax HG (Size 00) – 30ea	**Time**: 5-8 minutes **Speed:** 100rpm **Spheres:** 4 medium **Jar Size**: 100g jar size – 30cap	2.66 – 2.73% RSD from 10 replicate samples of compound capsules

Celulomax HG is a custom excipient vehicle that contains silicon dioxide colloidal, magnesium stearate, magnesium silicate, and microcrystalline cellulose

DiluCap SLD is a custom excipient vehicle offered by Fagron that contains silicon dioxide, magnesium silicate, pregelatinized starch, and microcrystalline cellulose

SimpleCap SLD is a custom excipient vehicle offered by Fagron that contains silicon dioxide, sodium starch glycolate, sodium stearyl fumarate, and microcrystalline cellulose

RSD = relative standard deviation

References:

1. Marianna B, Polonini H, Oliveira M. Ensuring homogeneity in powder mixtures for pharmaceuticals and dietary supplements: evaluation of a 3-axis mixing equipment. Pharmaceutics. 2021;13: 563-572.

Looking for more information? Reach out to the FACTS team at facts.support@fagronacademy.us