POLARDRY® ELECTROSTATIC DRYING:

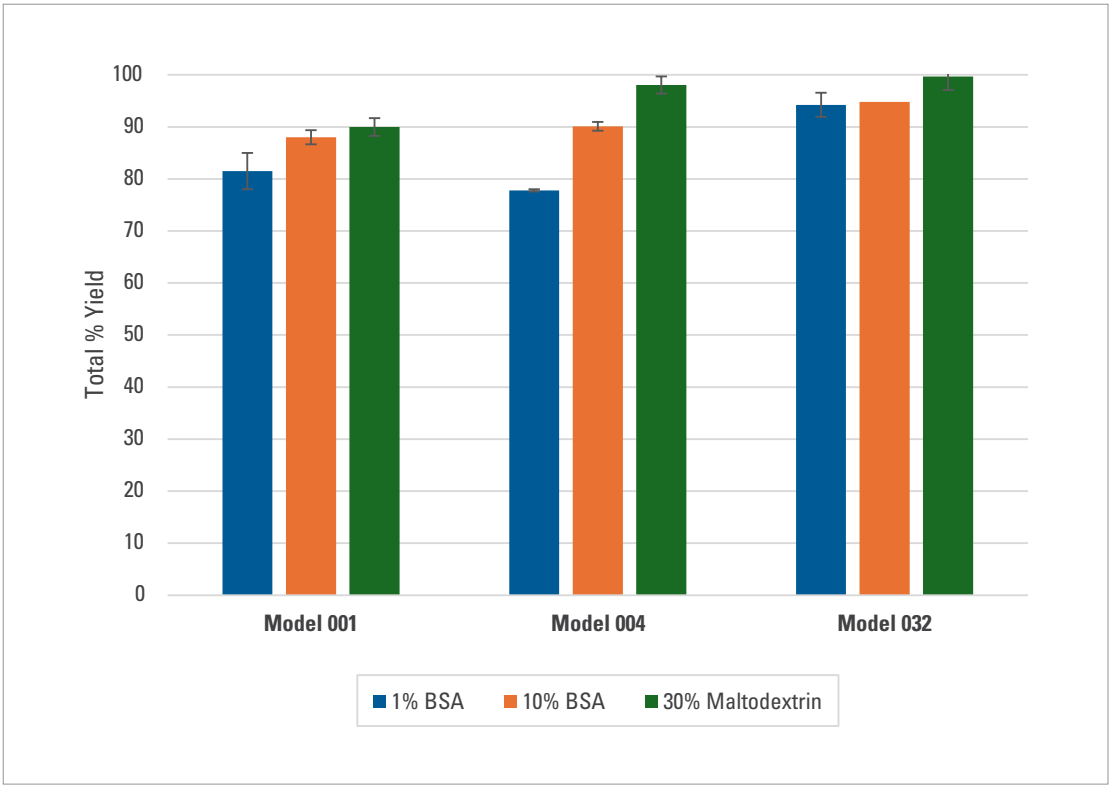
Process Scale-Up and Yield

CASE STUDY

HIGH-YIELD SCALE-UP OF POLARDRY® FROM R&D TO PRODUCTION SCALES

Taking a process from research to production scale presents a variety of challenges. Maintaining and improving the total yield during the scale-up process is critical. Compared to other drying technologies, PolarDry® allows for an easy scale-up that maintains, and often improves, the yields seen at smaller scales.

SCALE-UP YIELD BY POLARDRY® MODEL



TRENDS SEEN DURING THE SCALE-UP PROCESS

Yields generally increased as the size of the dryer increased. The only exception shown here was the Model 004 with the 1% BSA formulation. However, the yield was still high, around 78%. The yield also increased at each scale as the solid percentage increased between formulations. This is a normal correlation to material hang-up that is inherent on each machine in the PolarDry® line. Longer processing times increase yield by overcoming initial material hang-up.

POLARDRY® WORKS WITH A VARIETY OF FORMULATIONS

Three formulations were used to demonstrate the scale-up process, each with its own unique challenges and characteristics. Each formulation, described below, was dried at three different scales of PolarDry®: the Model 001, the Model 004, and the Model 032.

Equipment	Evaporative capacity of water per hour at maximum conditions on aqueous models
PolarDry® Model 001	1 kilogram
PolarDry® Model 004	4 kilograms
PolarDry® Model 032	32 kilograms

FORMULATIONS USED

30% Maltodextrin

The maltodextrin formulation has the highest solids content out of all of the formulations. It demonstrates the ability of PolarDry® to be able to maintain a steady state without being overwhelmed by larger quantities of powders.

1% BSA in 50:50 ACN:Water Mixture

The 1% BSA formulation has the lowest solids content. It demonstrates the ability of PolarDry® to be able to dry solvents in a safe, continuous manner. Additionally, it shows that PolarDry® is able to process extremely low solids contents while being able to maintain high powder recovery.

10% BSA

The 10% BSA formulation has the stickiest formulation. This demonstrates that PolarDry® is capable of drying sticky formulations that typically have low recovery yields on comparable pieces of drying equipment.

CONCLUSION

PolarDry® is an easily scalable technology that maintains or improves total yield as the process scales up. The three models used in this study—001, 004, and 032—are available for process testing at our Naperville, IL facility. Please reach out to Fluid Air with questions regarding the studies shown.

HIGHLIGHTS

1% BSA Formulation
Model 004 has the lowest average, but within the error

10% BSA
Least change from 001 to 032, increased at all scales

30% Maltodextrin
Total yield increases across all scales

Model 032
The largest unit had the highest yield in all studies

Total Yield
Production yields spanned 94.2% to 99.7%

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