nirrin

AT-LINE, ON-DEMAND EXCIPIENT ANALYSIS FOR BUFFER VERIFICATION

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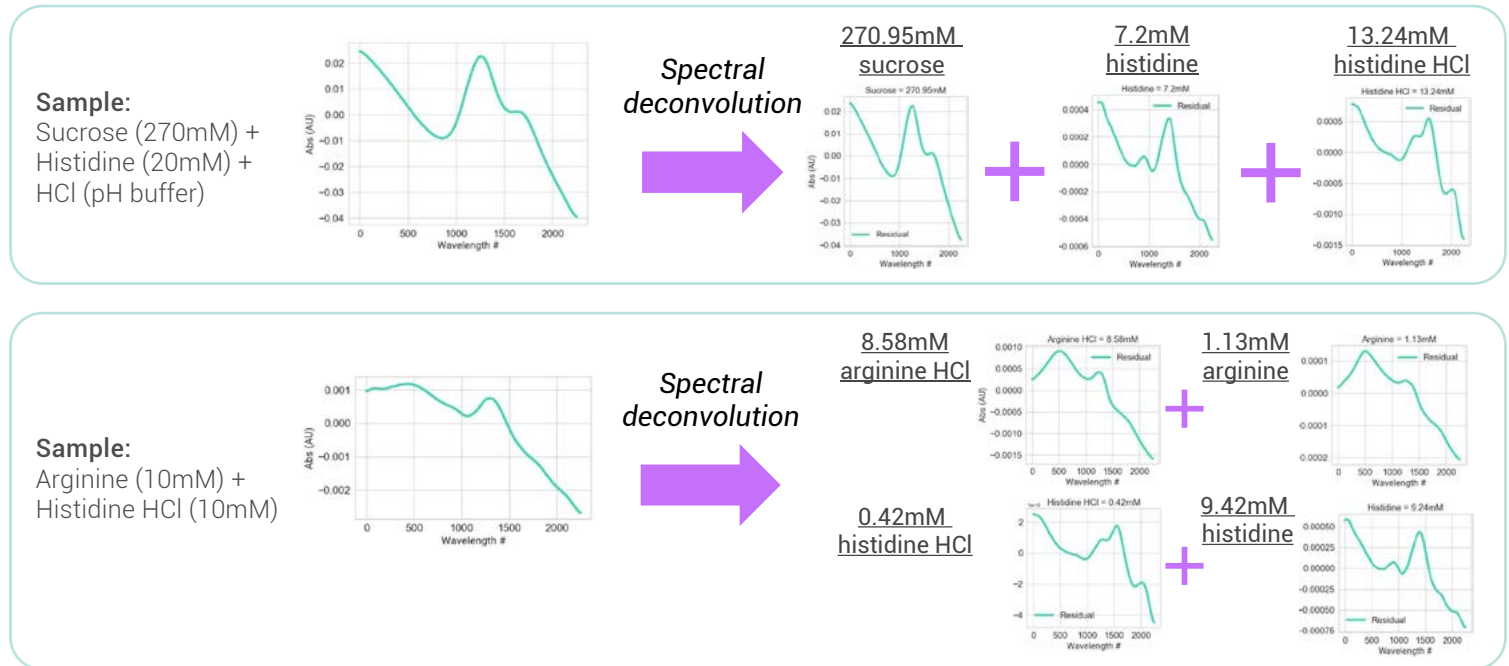Nirrin Technologies, Inc., Billerica, MA USA

SUMMARY

The concentration of excipients is crucial to stability of biologic drugs, but in downstream bioprocessing, it is not readily available due to the lack of accurate and easy-to-use at-line technologies. The Nirrin NXT system offers a solution by providing quick and precise quantitation of excipients in buffers without the need for sample preparation or dilution.

EXPERIMENTAL PROCEDURE

1. Pipette 15 µL of DI water on the pedestal and scan
2. Clean with Kimwipe
3. Pipette 15 µL of sample (of known concentration) and scan
4. Select analytes for quantitation, run analysis and obtain results

RESULTS: COMMON ION EFFECT

It was observed that when pH buffers such as HCl were used to balance the buffer, the NXT prototype was able to identify the equilibrium state of the solution. This has major implications in formulation stability, and currently, no other method captures this phenomenon.


Sample:
Sucrose (270mM) +
Histidine (20mM) +
HCl (pH buffer)

Spectral deconvolution

270.95mM sucrose + 7.2mM histidine + 13.24mM histidine HCl

Sample:
Arginine (10mM) +
Histidine HCl (10mM)

Spectral deconvolution

8.58mM arginine HCl + 1.13mM arginine

0.42mM histidine HCl + 9.42mM histidine

⬤⬤⬤⬤ illuminating insights

RESULTS: COMPLEX BUFFER COMPONENTS

With many buffer components, there are not available assays to measure concentration quickly and easily. The NXT allows for rapid quantitation of buffer components which would previously require extensive assay development.
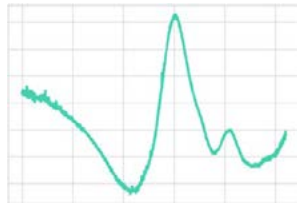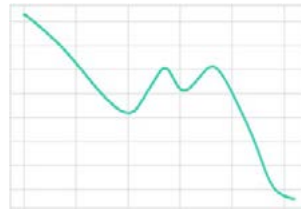
Surfactants:
E.g., Polysorbate 80/20 & Poloxamer
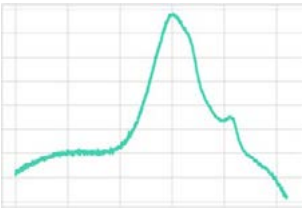
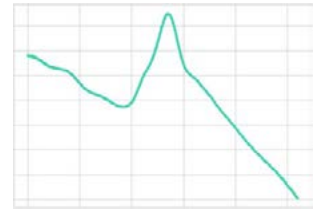**Chelators:**
E.g., EDTA & EDTA dihydrate

Sugars:
E.g., Trehalose, sucrose, sorbitol (alc.)

Buffer Components:
E.g., Tris

CONCLUSIONS

- The time and cost required for HPLC analysis of excipient concentrations does not align with the desired speed and frequency of sampling during process development.
- The use of the Nirrin buffer analysis system throughout downstream bioprocessing provides Industry 4.0 with a vital tool for making confident decisions and ensuring reliable manufacturing.
- The NXT system does not employ UV detection. Additionally, it does not use Raman or mid-IR spectroscopy, which generally necessitate expertise in chemometric modeling.
- This on-demand analysis of excipients ensures that the right buffer components are present in the correct concentrations during preparation and final formulation.