Technical Overview

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Biological Sample Storage and Recovery in Agilent Storage and Assay Microplates

Introduction

This technical overview demonstrates the low-binding attributes of Agilent storage and assay microplates that allow for the excellent recovery of DNA and protein samples under different storage conditions. Microplates provide a practical way of storing a large number of chemical and biological samples. Polypropylene plates with low-binding characteristics reduce biomolecule loss resulting from nonspecific binding to the well surface. Agilent supplies storage and assay microplates for a wide range of applications. These microplates are molded from medical-grade, chemical-resistant polymers and are available in 24-, 48-, 96-, and 384-well configurations of variable volumes. They are manufactured in a DNase/RNase-free and ISO 9001:2015 certified facility. The microplates can be sealed tightly for storage using Agilent PlateLoc microplate heat seals or adhesive films. Storage and assay microplates can be used across multiple workflows including, but not limited to, high-throughput screening in drug discovery, molecular biology, and genomic applications.

Material and methods

Protein binding test

Multiple configurations of Agilent storage polypropylene microplates were evaluated (0.058 and 0.2 mL well size in a 384-well format or 0.45 and 1.1 mL well size in a 96-well format), as shown in Table 1. The plates were filled to the recommended capacity with 5 and 10 µg/mL of bovine serum albumin in Dulbecco's phosphate-buffered saline, sealed, and stored at three temperatures (23, 4, and –20 °C). After approximately 24 hours, the protein concentration was determined using the Quant-iT Protein Assay Kit, following the vendor's protocol (Thermo Fisher Scientific, part number Q33210). Fluorescence intensity was measured at excitation and emission wavelengths of 470 and 570 nm respectively, using an Agilent BioTek Synergy H1 multimode reader. The protein concentrations were determined relative to the kit standards and expressed as a percentage of the starting concentration.

DNA binding test

The plate formats listed in Table 1 were also evaluated for DNA binding. The plates were filled to the recommended capacity with 5 and 10 µg/mL of salmon sperm DNA (Thermo Fisher Scientific, part number 15632011) in Tris-EDTA buffer (10 mM Tris, 1 mM EDTA, pH 8.0), covered tightly with an adhesive seal, and stored at three temperatures (23, 4, and –20 °C). After approximately 24 hours, 2 µL of the DNA solution was removed from each well in duplicate and transferred to an Agilent BioTek Take3 microvolume plate. Measurements of absorbance at wavelengths of 260 and 280 nm were taken using an Agilent BioTek Synergy H1 multimode reader and DNA concentrations were calculated using Agilent BioTek Gen5 microplate reader and imager software. The percent recovery was then calculated relative to the starting concentration.

Table 1. The evaluated Agilent storage/reaction microplates.

Well Number	Part Number	Well Volume (mL)	Product Description
96	201276-100	1.0	Storage/reaction microplate, ultrahigh purity polypropylene, square well, conical bottoms, 31 mm height
	203942-100	0.5	Storage/reaction microplate, polypropylene, round well, spherical bottom, 14.3 mm height
384	204586-100	0.2	Storage/reaction microplate, polypropylene, square well, spherical bottoms, 19 mm height
	201288-100	0.058	Storage/reaction microplate, polypropylene, square well, spherical bottoms, 14.5 mm height

Results and discussion

This study was designed to determine the amount of protein or DNA bound to the surface of the storage wells after 24 hours. The protein recovery after storage averaged greater than 95% (Figure 1) and the DNA recovery greater than 94% (Figure 2) of the initial stock, regardless of the representative formats assessed or the storage temperatures evaluated. The Agilent 96-well storage/reaction microplate (part number 203942-100) showed equivalent recovery when compared to competitor 96-well plates with similar volume and well bottoms (Figure 3).

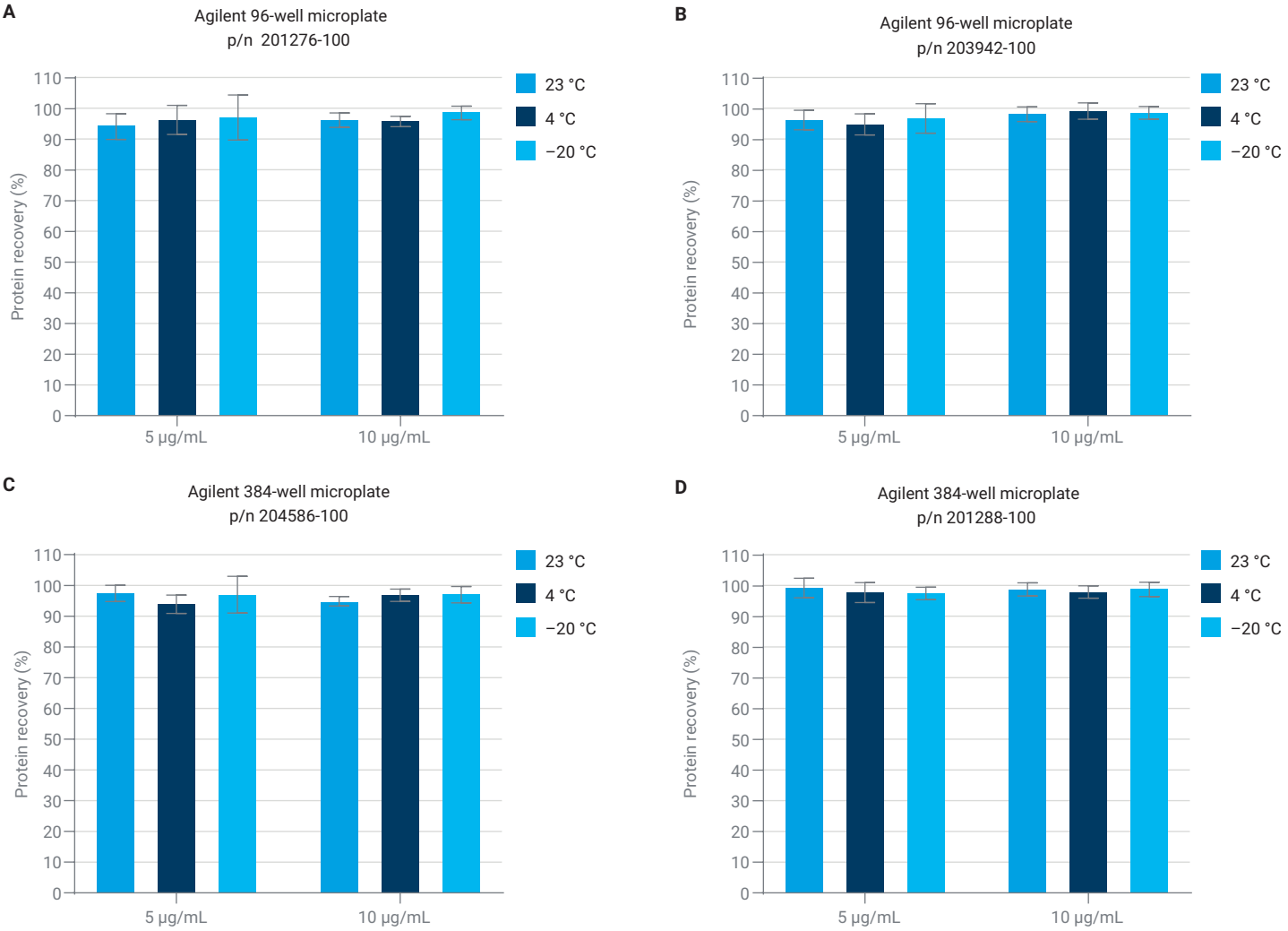

Figure 1. Protein recovery of samples stored at three temperatures in two Agilent 96-well (A and B) and 384-well (C and D) storage microplates. Error bars represent the standard deviation from 12 replicate wells.

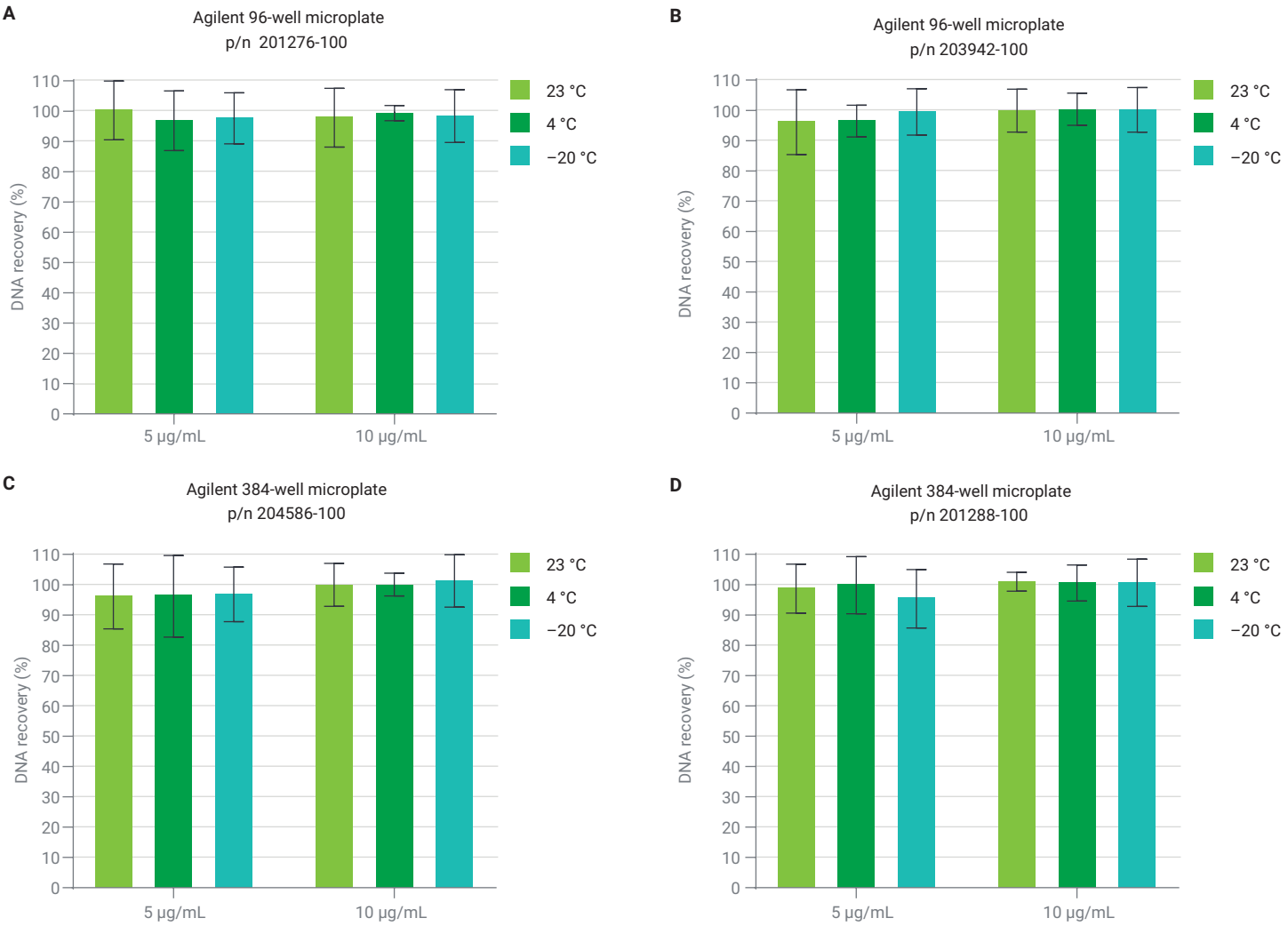

Figure 2. DNA recovery of samples stored at three temperatures in two Agilent 96-well (A and B) and 384-well (C and D) storage microplates. Error bars represent the standard deviation from 12 replicate wells.

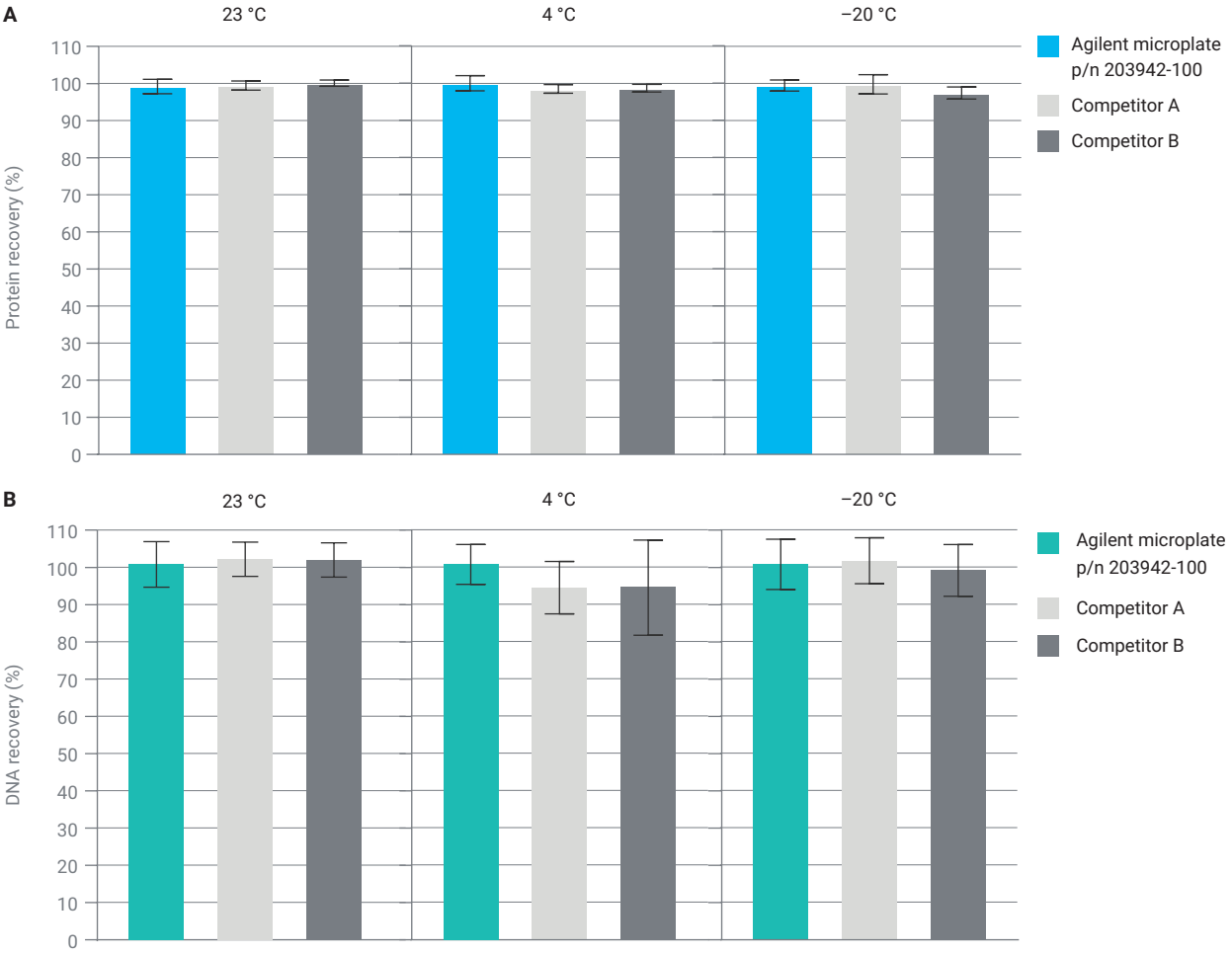

Figure 3. Percent sample recovery of protein (A) and DNA (B) in an Agilent 96-well storage microplate, compared to in competitors' 96-well storage microplates of similar configuration. Error bars represent standard deviation from 12 replicate wells.

Conclusion

Agilent provides an extensive portfolio of polypropylene microplates to meet multiple storage, assay, and sample-processing workflows. The low-binding property of the polypropylene resin minimizes the binding of organic molecules, and here we demonstrate these properties in a subset of plate configurations using dilute solutions of protein and DNA. Agilent storage and assay microplates provide an efficient and reliable way of storing and processing large numbers of biological samples with excellent sample recovery.

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