

## APPLICATION NOTE

Partnering with our customers to design innovative solutions to their specific application challenges

# The Importance of Gas Permeability in Cell Culture Applications

## CHALLENGE

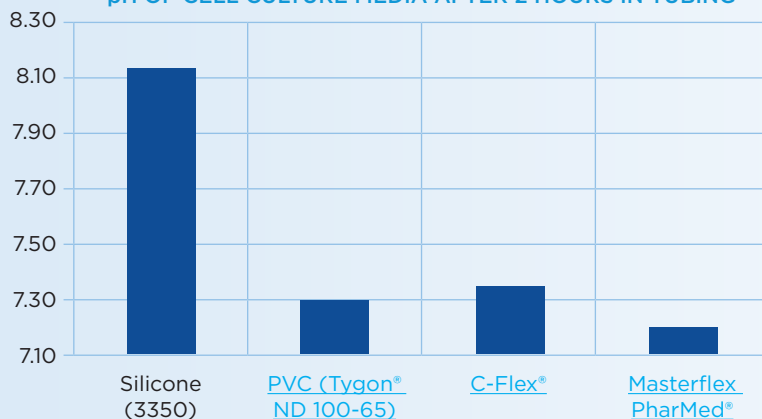
- > The use of silicone tubing as part of an assembly containing cell culture media
- > Observation that pH values rose about target regime when tubing, filled with media, was in air as well as placed in standard incubator (CO<sub>2</sub> at 5%)

## PROPOSED SOLUTIONS

- > Eliminate or minimize silicone tubing length to reduce surface area available for CO<sub>2</sub> transport and the volume of media impacted at any given time
- > Raise incubator CO<sub>2</sub>
- > Use supplemental buffer for extra buffering capacity

## UNDERSTANDING THE EFFECT OF GAS PERMEABILITY ON pH

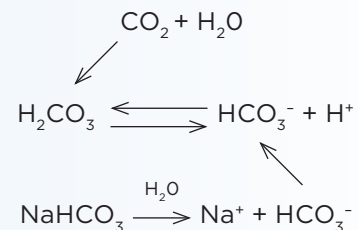
pH OF CELL CULTURE MEDIA AFTER 2 HOURS IN TUBING



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## Analysis

- > CO<sub>2</sub> dissolved in media and in the atmosphere outside of the tubing drive toward equilibrium
- > High gas permeability of silicone compared to other materials accelerated the cell culture pH to reach equilibrium

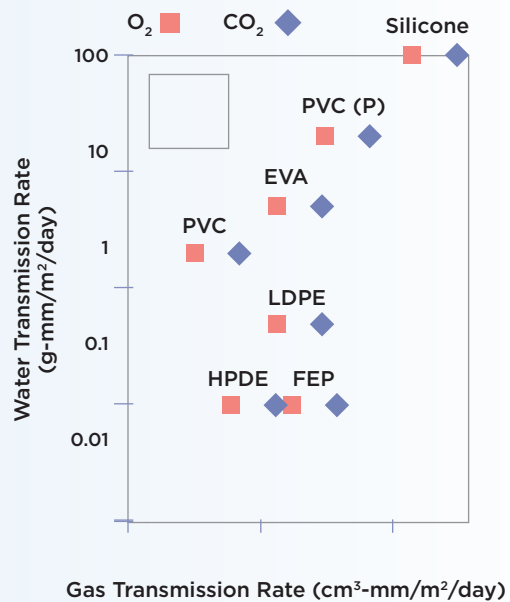


## UNDERSTANDING PERMEABILITY

**Permeation:** The penetration of a liquid, gas or vapor (a permeate) through a solid; for example, a polymer

Factors impacting the permeability of polymers:

- > Size and physical state of penetrating molecule
- > Morphology and other properties of the polymer
- > Solubility/diffusivity of the permeable molecule in the polymer matrix
- > Presence of fillers, humidity and plasticization



### References

1. [Comyn, J. \(1985\) Polymer Permeability. New York, NY: Chapman & Hall](#)



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