

# Determination of pH for an Oil-in-Water Based Semisolid Cream: Method Development and Standardization



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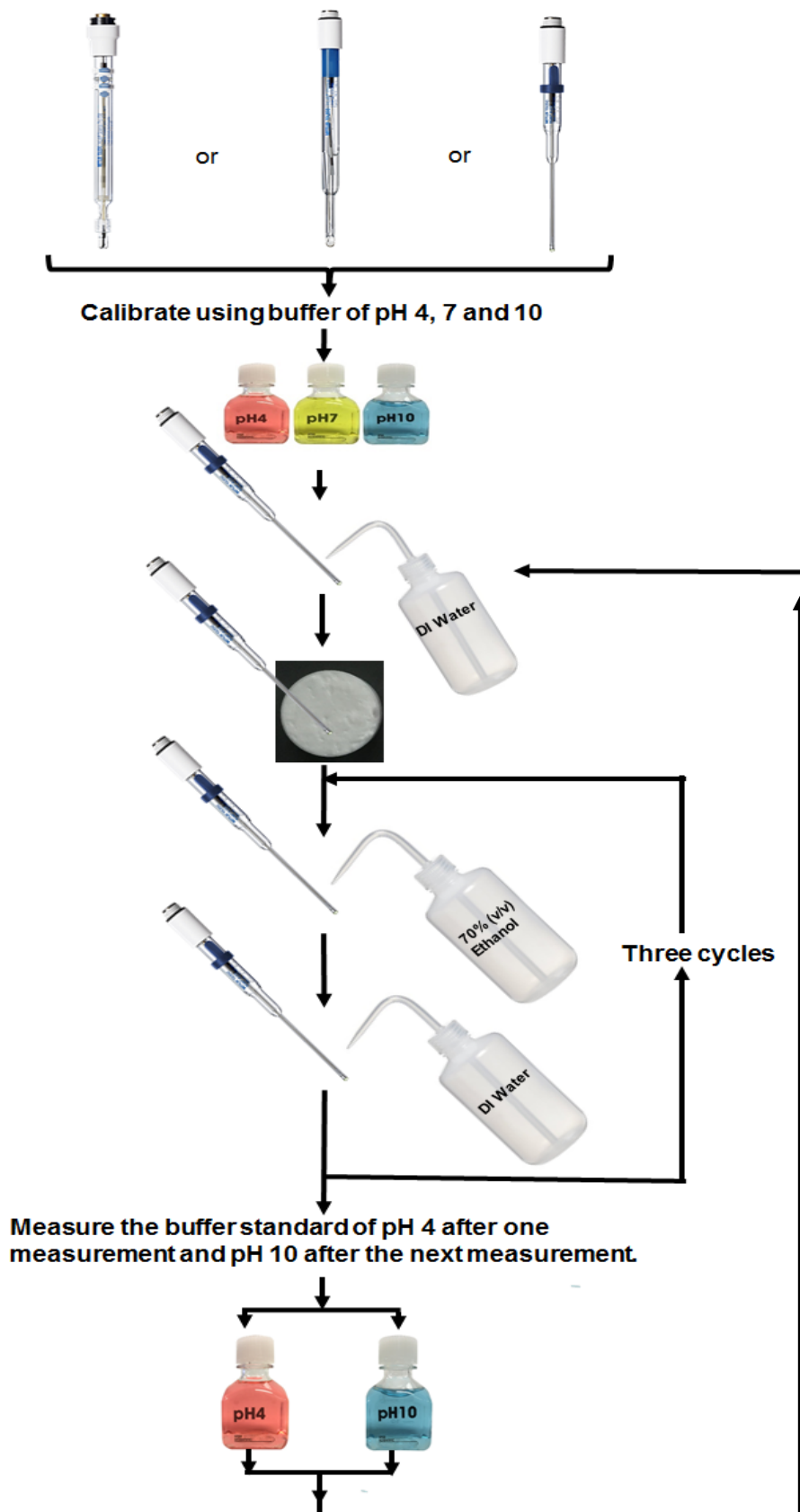
## PURPOSE

The measurement of pH in semisolid cream products is challenging due to their viscous nature and complex multi-phase microstructure. For a reproducible and precise measurement of pH, it is critical that the pH probe establishes a uniform surface contact and attains equilibrium with the test material. The goal of the current study was to develop and standardize a robust method for the measurement of pH in oil-in-water based cream products.

## METHOD

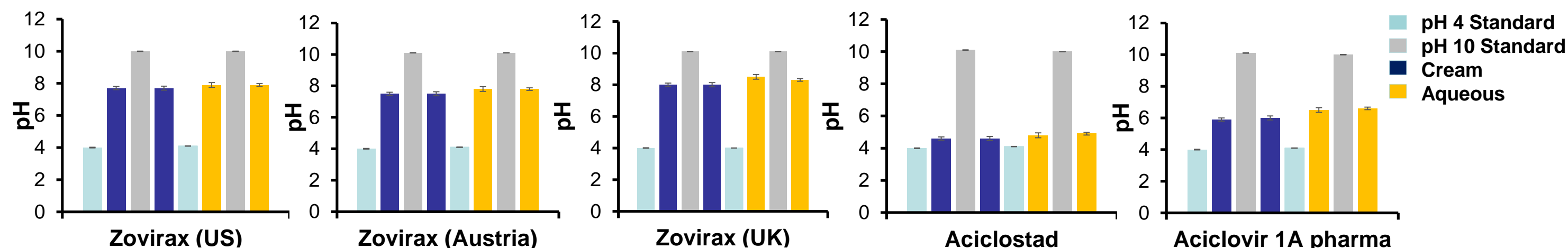
Three pH probes (InLab Science Pro<sup>®</sup>, InLab Viscous<sup>®</sup> and InLab Micro<sup>®</sup>) were identified from reports in the literature and from recommendations by the manufacturer. The pH probes were calibrated using buffered pH standards of pH 4, 7 and 10. One gram of the cream was filled in a container and tapped to remove any entrapped air. The probe was immersed in the cream, with care to ensure that the tip of the probe was completely covered by the cream. After measuring the pH, the cream was wiped off and the probe was rinsed sequentially with 70% (v/v) ethanol and distilled deionized water, and its performance was verified with buffered pH standards. If the confirmatory pH measurement of the buffered pH standard differed by 0.5 pH units or more, the probe was cleaned again using the protocol above. While measuring the pH of the creams, each replicate serial measurement was alternated with a probe cleansing and a verification of pH measurement using a buffered standard of pH 4 after one measurement and of pH 10 after the next. The pH of each cream was recorded as an average of five replicate measurements.

InLab-Viscous<sup>®</sup> InLab Science Pro<sup>®</sup> InLab Micro<sup>®</sup>



(The images of the probes shown in the figure were obtained from Mettler Toledo website)

## RESULTS



The pH was measured using three selected pH probes. The InLab Science-pro<sup>®</sup> and InLab Viscous<sup>®</sup> probes feature a thick glass membrane while the InLab Micro<sup>®</sup> features a thin glass membrane with a relatively lesser surface area. The variation in the pH values between each reading measured using InLab Micro<sup>®</sup> was also relatively smaller compared to the InLab Science-pro<sup>®</sup> and InLab Viscous<sup>®</sup> probes. After each measurement, it was important to wash the probe thoroughly to remove any residual coating (which may not be visible) of the formulation contents. This coating might interfere with the subsequent measurements if the coating were to prevent the probe from establishing a salt-bridge with the external aqueous milieu. The sequence of wash cycles and pH measurement verification after each measurement of the cream pH (described above) were intended to remove any such coating on the probe surface and to verify the corresponding functioning of the probe. The pH of acyclovir cream products, measured using the InLab Micro<sup>®</sup> probe was consistent and reproducible. The pH of three acyclovir cream 5% (Zovirax) products marketed in different countries was in the range of  $7.71 \pm 0.01$  to  $7.97 \pm 0.03$  while the pH of two other Austrian acyclovir cream 5% products, Aciclostad and Aciclovir-1A, was more acidic with a pH of  $4.56 \pm 0.03$  or  $6.05 \pm 0.27$ , respectively.

## CONCLUSION

A method for pH measurement of semisolid acyclovir cream 5% products was developed. Intermittently cleaning the probe surface thoroughly and verifying its measurement accuracy by using a buffered pH standard was considered prudent for the accurate and precise measurement of pH and may be an appropriate approach for measuring the pH of such semisolid dosage forms.

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