

# EQUILIBRIUM SOLUBILITY STUDIES OF CREATINE NITRATE, CREATINE MONOHYDRATE AND BUFFERED CREATINE

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## **Purpose.**

The objective of this study was to determine the equilibrium solubility of creatine nitrate (CN), creatine monohydrate (CM) and buffered creatine (BC) in water at 25°C as well as in pH 2.5 buffer at 25°C and 37°C.

## **Methods.**

Excess sample was added to the appropriate solvent and agitated at 150 rpm at constant temperature. The supernatant was collected at 24, 48, and 72 hours till equilibration, centrifuged and analyzed by HPLC. The pH of the solution was monitored and Differential Scanning Calorimetry (DSC) thermograms of the solid samples before solubility and of the lyophilized sample after solubility studies were compared.

## **Results.**

The equilibrium solubility of CN, CM and BC in water at 25°C was reached in 44 hours, and was 210.3±4.82 mg/ml, 19.1±0.40 mg/ml and 19.2±0.55 mg/ml, respectively. However, solubility for CN, CM and BC in pH 2.5 buffer at 25°C was 208.2±6.01 mg/ml, 23.8±0.33 mg/ml and 21.2±0.09 mg/ml and achieved within 72 hours for CN and in 48 hours for CM and BC samples, respectively. At 37°C and in pH 2.5 buffer, the equilibrium solubility was reached within 24 hours for all samples and was 325.9±6.10, 31.5±0.71 and 32.6±0.67 for CN, CM, and BC. The pH of solutions of CN, CM and BC in water at 25°C was 0.44±0.04, 8.24±0.14 and 10.03±0.02 respectively. However, these values in pH 2.5 buffer at 25°C were 1.31±0.02, 3.44±0.02 and 3.68±0.01 and at 37°C this was 1.13±0.07, 3.86±0.47 and 4.42±0.05, respectively. DSC thermograms of the original samples and lyophilized samples were identical.

## **Conclusion.**

The solubility of creatine nitrate was around 10 fold higher than that of CM or BC. No significant difference in the solubility of CM and BC were noticed. There was an increase in solubility of each of the creatine forms in pH 2.5 at a higher temperature. No phase change was noticed during these solubility studies.