RELEASE KINETIC MODELS OF PENICILLIN G BENZATINE FROM NANOCAPSULES AND LIPOSOMES: A NEW LOOK BASED ON LINEAR SYSTEMS. Santos Magalhães, N.S., Pontes, A.C.O., de Oliveira, H.M., *Laboratório de Tecnologia Químico-Farmacêutica,* UFPE, E-mail: {Nssm,Hmo}@npd.ufpe.br

Objectives: A new approach is introduced to examine the release kinetic of a drug carrier, which is based on the linear systems. A few examples of Penicillin G Benzatine (PenGB) release models from nano particulated systems are considered. **Methods and Results:** The PenGB release from nanocapsules and charged liposomes is examined by the inverse bulk dialysis method. The Penicillin release from nanocapsules furnishes a typical kinetic profile from nanoparticulated carriers. In contrast, when liposomes are used as a carrier for the PenGB, the kinetic profile presents an "oscillatory" behavior and the released drug often exceeds the steady state response (100%). The filter impulse response corresponds to a "channel" model of the drug delivering system. The time that is required to release almost all the content entrapped into nanoparticles could be evaluated by calculating the response time of the filter. A naive model corresponds to a 0.0628 rd/min (1/6 mHz) cut-off frequency ideal low-pass yielding a rise time of 45-60 min. **Conclusions:** A new interpretation of the drug release kinetics is presented which exploits the signal and system characterization. It is shown that the release rate model corresponds to the unit step response of a time-invariant *linear low-pass filter*. The rather uncommon Penicillin release profile from charged liposomes exhibits an overshoot and underdamped oscillations (a non-fickian diffusion). The tools here introduced can help understanding such an unusual behavior of drug delivery from charged liposomes. Information is given to avoid erroneous or misinterpreted conclusions from anyone insufficiently familiarized with such kinetic profiles.

Financial support: CNPq, CAPES-COFECUB