

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Microgravity Sciences Onboard the ISS and Beyond (7)

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MICROGRAVITY RESEARCH APPLICATIONS IN LIFE SCIENCES USING CLINOSTAT

Abstract

Microgravity environment is an outstanding platform for research, application and education in the following science disciplines: space, biology, material, physical and Earth observation. Microgravity is known as a condition of assumption of weightlessness. All experiments that are performed under 1G can be repeated under microgravity environment if available, likewise new experiments can be formulated to compare the results gotten under 1G against microgravity. Space flight microgravity experiments are unusual and expensive, this therefore restrict the number of research scientists in this area. On the Earth, weightlessness platforms available are experienced during free-falls, in Balloons, Sounding-Rockets etc; all these platforms are fast responding. There are some experiments that are slow responding to microgravity and they will need hours or even days under conditions of weightlessness. This led to the development of several alternative ground based instruments for simulation of microgravity or elimination of gravity. Clinostat is one of such instruments.

To perform experiments using clinostat, possible samples are plants, cells, micro-organisms, fungi and small samples from material sciences, but it cannot accommodate more than 500g of sample. Depending on the sample chosen, there are many factors such as the humidity, temperature and light that need to be maintained at a specific range, while on the clinostat rotation speed, rotational-axis angle and rotation-direction depends on the discretion of the experimenter.

Researches under simulated microgravity provides insight into certain processes and phenomena, for example, understanding how organisms and matter react to gravity and its absence will lead to new applications that benefits mankind. It also creates a data set of experimental results in gravity responses that could contribute to the design of future space experiments.

In this paper, the applications and advantages of research in the life sciences using clinostat are enumerated. This includes the benefits in agriculture, pharmacy, medicine, microbiology, biotechnology etc. This paper also tells about the result of some selected experiments performed using clinostat and other possible experiments that can be performed in the future.