CHAPTER-8: RESPIRATORY METABOLISM OF A. testudineus ON EXPOSURE TO OPME.

8.1 INTRODUCTION:

Industrial wastes and effluents have been noted to cause heavy fish mortality by affecting their respiratory metabolism (Quasim & Siddiqui, 1960; David and Ray, 1966; Venkatraman, 1966). Study of respiratory metabolism of organism has been used to assess the interaction between a the species & environment. Information regarding relationship of oxygen consumption of an organism with diet and seasonal changes exists (Lenaluth & Naidu, 1997). Respiratory metabolism of Channa striatus decreased after two days of exposure to crystal violet dye effluent (Kandeepan et al., 1993). Singh et al., (1994) found significant correlation between change in the quantity of oxygen with the river water & with the effluent quantity.

Presence of heavy metals (Reddy et al., 1993; Mule et al., 1994) pesticides (Mishra et al., 1994) in the aquatic medium does reduces the oxygen consumption rate the aquatic organisms. Observation on the effect of different concentration of industrial effluents collected from the Santha Nagar Industrial Area of Hyderabad on the rate of oxygen consumption showed decreased with increased in the concentration of the effluents (Hingorani et al., 1979). Muir and Nimi (1972) have studied the oxygen consumption of fish in relation to salinity, temperature and food
shows that in all the four groups of fishes treated with 5, 10, 20 & 40% of OPME there was a decrease in Oxygen consumption from the control value (0.26 ± 0.006). The rate of decrease was 18.46% in 5%, 50.38% in 10%, 53.06 in 20%, 67.69% in 40% OPME effluent exposed fish. The difference in the oxygen consumption in different concentration was statistically significant (F=1440.6, P<0.001) and positively correlated to depletion in haemoglobin concentration (r=0.97) and total erythrocyte count (r=0.91).

8.4. DISCUSSION:

The results obtained during the course of the present investigation clearly suggests that paper mill effluent affects the respiratory metabolism in the fish A.testudineus to different degree depending upon the effluent concentration. It is evident that the effluent exposed fishes experienced hypoxic stress condition which may be due to the fact that the effluent act as a potent inhibitor of oxygen consumption & the decrease is obviously due to the entry of toxic material & rupture of secondary gill Lamellae. Sunder Singh et al., (1995) have opined that the DO level of the fresh water bodies decrease as a result of contamination with industrial effluents, which in turn causes fish mortality due to asphyxiation.
Figure-15. CHANGES IN THE RATE OF OXYGEN CONSUMPTION (mg O₂/g body wt./hr.) OF A. testudineus ON EXPOSURE TO PAPER MILL EFFLUENT
Anusha et al., (1994) & Mishra et al., (1994) have obtained similar results while working on the effects of different pesticides on fishes. Sarkar (1989) also reported decrease in oxygen consumption in mercury and chromium treated *Tilapia mossambica*. Hingorani (1979) have observed decrease in the rate of oxygen consumption in *Labeo rohita* under the stress of different concentration of industrial effluent. High concentration chlorides & sulphates leads to fish mortality by coagulating the gill mucous there by interfering with respiratory metabolism. The decrease in the metabolic rate of *A.testudineus* on exposure to OPME could be due to the loss of haemoglobin and secondary gill lamellae which has been reported earlier in this present investigation.

Oxygen is one of the most important factors in an aquatic ecosystem and the oxygen pulse plays an important role in the survival and sustenance of Aquatic habit. Prasad et al., (1991) have pointed out that the rate of oxygen consumption is a true index of the metabolic state, particularly in aquatic animals and oxygen depends a great deal in stress condition caused by environmental toxicants. The findings of the present investigation clearly indicates that the paper mill effluent suppresses the rate of Oxygen concentration in fishes thereby Leading to their death.