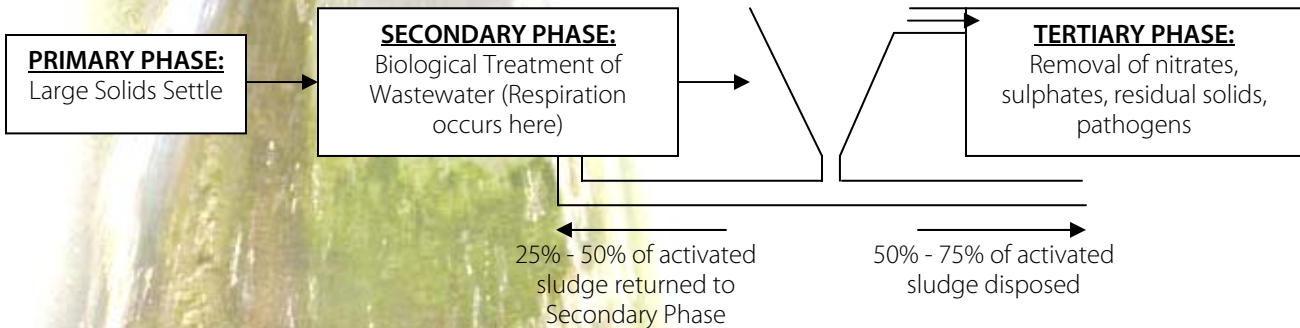


## Biological Wastewater Management

Biological wastewater management is an increasingly popular option with industries whose wastewaters are rich in organic carbon such as beer brewing, animal processing, paper manufacturing and sewage treatment. The process of such biological treatment is simple in theory: bacteria use oxygen to burn or break down organic carbons into carbon dioxide, water and energy. This energy is then used to fuel bacteria growth and metabolic activities. As the process suggests, oxygen is a crucial component in this equation. During the biological treatment process, air or pure oxygen is introduced into the tank. This process, known as aeration, is essential in fuelling the aerobic respiration of the bacteria.

Typically, a biological treatment plant is made up of three parts: the Primary Phase, where settlement of solid waste occurs; the Secondary Phase, where the main biological treatment occurs, and the Tertiary Phase, where the quality of the effluent is further improved by removing any nitrates, phosphates, residual suspended solids or pathogens in the water (Diagram 1):



**Diagram 1: Typically, wastewater goes through three phases before it is released into open water.**

The growth rate and activities of the carbonaceous bacteria found in active sludge during the Secondary Phase doubles with every 10°C increase in temperature, between the range of 0°C to 30°C. Solubility of oxygen, on the other hand, reduces as temperature increases, making optimal aeration more difficult and costly as temperature within the tank rises. Since approximately 50% of the energy cost in a normal biological treatment plant goes to aeration, this inversed relationship between the solubility of oxygen and performance of bacteria means that oxygen concentration and temperature must be carefully managed to achieve optimal performance per unit cost.

Ideally, a biological treatment plant operating at optimal efficiency should see about 90% - 95% of the influent dissolved oxygen removed at the end of the secondary tank. When oxygen levels are too low, the bacteria respiration activity takes a dip, leading to stagnant growth due to lack of energy. Filamentous bulking may also occur, giving rise to settlement problems. On the other hand, too high a level of dissolved oxygen indicates wastage, and may encourage growth of other superfluous organisms that hinder the treatment process. Active slime that develop around the DO sensor, for example, consume oxygen and thickens the sensor membrane, causing over-aeration due to dissolve oxygen readings that are lower than they actually are. To maintain maximum efficiency and minimum aeration cost, dissolved oxygen is normally kept within a narrow range of 1.5ppm – 2ppm.

The alpha DO2000 series is equipped with a 2-point set relay which allows for easy control of dissolved oxygen level between your critical dissolved oxygen ranges. For optimal plant efficacy, the controller also allows you to control temperature from -10.0°C to 125.0°C with up to ±0.5 accuracy. The controller comes with a separate wash relay so sensors are cleaned automatically on a regular basis for reliable and accurate dissolved oxygen measurement.

For random checks in the plant, the CyberScan DO600 is equipped with a wide measurement range so you can use one meter to measure dissolved oxygen levels from the point of water intake to the point of water discharge. Quality-monitoring within a range of values is easy—the DO600 is equipped with A-B set points function so meter alerts once readings fall outside designated range.

For more information on the Eutech's range of dissolved oxygen instruments, contact us now at [marketing@eutechinst.com](mailto:marketing@eutechinst.com).