

INTRODUCTION

Biodegradation is the process by which organic substances are decomposed by micro-organisms (mainly aerobic bacteria) into simpler substances such as carbon dioxide, and water. Biodegradation is one of the most important factor to assessment the environmental fate of chemicals. Substances that are coming and subsequently getting in contact with the aquatic microorganisms, which is therefore the basis for the assessment of aquatic biodegradation.

OBJECTIVE

To find out suitable solubilizing agent, which can be use as solubilizing agent for poorly water soluble test compound and it also can be fulfil the validity criteria.

APPROACHES TO DEAL WITH POORLY WATER-SOLUBLE COMPOUND

- Ultrasonic Dispersion
- Adsorption on Silica
- Direct Addition Method
- Emulsifier or Surfactant or Solvent can use as a Solubilizing Agent
- Solvent Evaporation

VALIDITY CRITERIA

The validation criteria for solubilizing agents are:

- It should not be toxic to bacteria
- It should not be biodegraded
- It should not be cause foaming under test condition
- Dissolved oxygen depletion in the test blank should be less than 1.5 mg/L after 28 days
- Positive Control should be degraded >60% on 14 day of analysis

SOLUBILIZING AGENTS

Total six solubilizing agents has been selected for the test as mentioned below :

- IGEPAL
- SILICON OIL AR 20
- SDS
- Triton
- Tween 20
- Tween 80

EXPERIMENTAL PROCEDURE

The inoculum was collected from STP-JRF, filtered and kept for pre-conditioning for 5 days and analyzed for microorganism concentration on day of application.



Mineral media was prepared using variety of different salts in varying concentration and kept for aeration up to 20 h.



All the solubilizing agents and inoculum were added to mineral media in separate test vessel, mixed and then transferred in to separate 300 mL BOD bottles in two replicates.



Similarly positive control set using Sodium Benzoate was prepared and run simultaneously to check the validity of the test along with control sample.



Toxicity control was prepared with addition of each solubilizing agent with Sodium Benzoate in separate test vessels.



All the samples were kept in BOD incubator at 22 ± 2 °C and dissolved oxygen was measured by pre-calibrated DO meter on the day 0, 7, 14, 21 and 28.

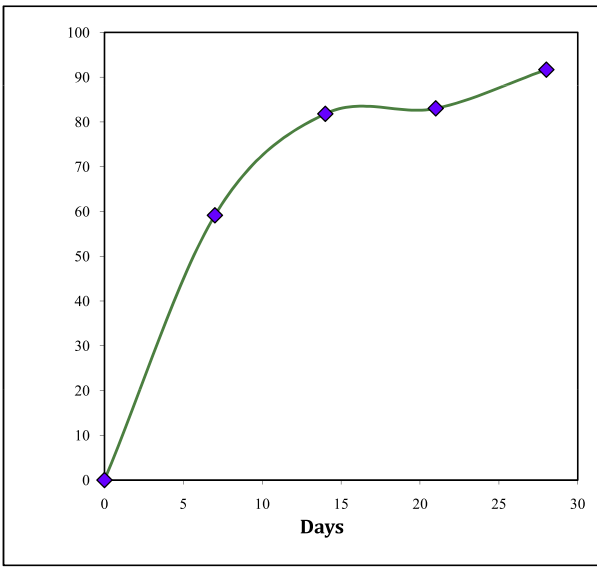
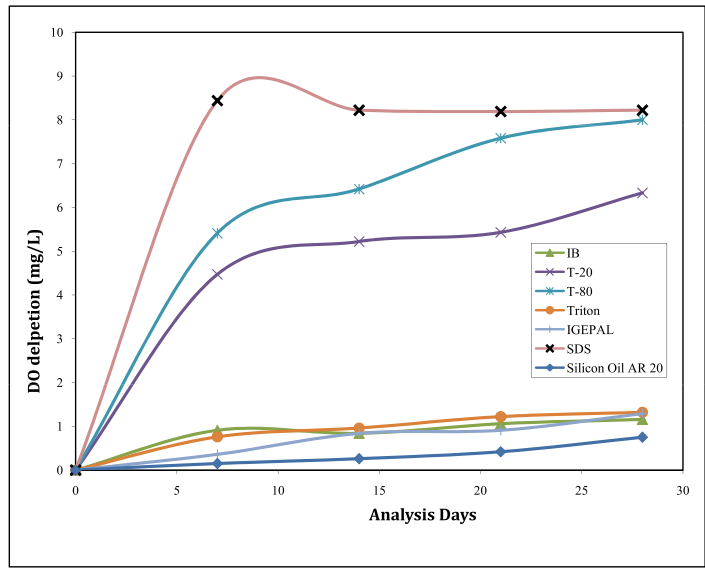
EXPERIMENT RESULTS

Depletion of Dissolved Oxygen				
Sample	7	14	21	28
Inoculum Blank	0.91	0.84	1.06	1.16
Positive Control	2.89	3.58	3.84	4.23
Tween -20	4.47	5.22	5.43	6.33
Tween -80	5.41	6.42	7.58	8.00
Triton	0.76	0.96	1.22	1.32
IGEPAL	0.36	0.84	0.91	1.29
SDS	8.44	8.22	8.19	8.22
Silicon Oil AR 20	0.15	0.26	0.42	0.75

Degradation (%) in Toxicity Control				
Sample	7	14	21	28
Triton	66.27	77.07	78.21	90.16
IGEPAL	63.93	74.67	86.01	95.86
Silicon Oil AR 20	54.02	71.67	84.81	94.66

Degradation (%) on Day				
Sample	7	14	21	28
Positive Control	59.12	81.81	83.01	91.66

GRAPHICAL DATA



CONCLUSION

The test results indicate that Triton, IGEPAL and Silicon Oil AR 20 are non-biodegradable and non-toxic to bacteria. So they can be use as solubilizing agent for poorly water soluble compound for Ready biodegradability test. While Tween-20, Tween-80 and SDS are non-toxic to bacteria but highly biodegradable. Therefore, they are can not be use as solubilizing agents for the test.

REFERENCE

OECD Test guide line 301 "Ready Biodegradability".