EXPERIMENT ON MICRO-BIOLOGICAL DEGRADATION OF PAINT SLUDGE

BACK-GROUND:

TVS Motor Company generates about 1200 kg of waste paint sludge during painting.
Process constituting on an average about 30 to 50% moisture, 10 to 15% solvents and the balance being inorganic solids including polymers. This is a notified hazardous waste.
Currently there are no environmentally sound disposal methods in our knowledge except incineration or secured land filling. Both these methods apart from being expensive disposal methods – also may cause other environmental related problems.

INVESTIGATION:

We are at present conducting some studies for micro-biological degradation of this waste material into useful Compost with the help of an institution at Auroville, Pondicherry. This Institution is engaged in research on similar projects under the guidance of a Japanese Professor in the name of EM- Technology.
We are giving a brief on the first pilot project below – which is self explanatory.

Situation and task

TVS Motor Company generates about one ton per day of paint sludge (which after two years decreases to half its weight.) The sludge is regarded as hazardous waste and hence is being stored separately. Over the last six to seven years – since commencing separate storage – at least 1,200 tons have been kept separately. No treatment of this waste is known
The objective of the trials with EM is to assess whether EM treatment can transform paint sludge into something less hazardous, or into a resource, such as compost for forestry. “Pollution Control Acts, Rules and Notifications issued thereunder” published by CPCB, New Delhi, September 2001, provide standards for the composition of compost derived from municipal solid waste, not meant for use of food crop cultivation, but for any other purpose.

Results and discussion of results

The chemical analysis of the paint sludge treated over five weeks with three forms of EM bokashi, each under aerobic and anaerobic conditions, against the composition of the untreated paint sludge (“control”) shows highly encouraging results. Indian standards have been met or only marginally not met. EM fly ash bokashi shows a capability for elimination of heavy metals, EM rice husk bokashi shows the best elimination of organic chemical solvents and reduction of COD and BOD.
Interpretation of the data has to take into consideration that the “control” sample consists of 100% paint sludge, while the EM-treated samples originally consist of 50 weight % paint sludge and 50 weight % bokashi material. However, the results remain the same: EM treated paint sludge seems to qualify as compost for forestry.

Question: standardization of test procedures is assured, recommended preparation of sample (extraction method of compound to be measured) remains unknown
Question: standardization of sampling – discussed. Need for extremely thorough and even mixing prior to sampling so as to obtain representative samples.
Explanations and hypotheses for mechanisms of action (of microbes on complex toxic chemicals and heavy metals): As expressed in the study from EM Research Organization Denmark of 1999, one hypothetical possibility are changes in the state of ionization, in which the critical element becomes non-accessible (to detection method). Another possibility is the transmutation of elements as researched upon by L. Kervran.

Next steps

If EM-treated paint sludge – by absence of toxic levels of compounds - qualifies as forestry compost, its actual use will have to be assessed, probably in discussion with TNPCB. In this case,

not only Indian standards for compost from municipal solid waste will apply, but it will also have to be assessed whether potentially hazardous compounds of the original waste material (paint and solvents) are absent or present only below critical levels. Hence, chemical testing should be done not only on chromium, lead, nickel, and zinc, but also on arsenic and on cadmium. Any other hazardous substances identified or known in the original material?
Parameters to be assessed: all parameters as in the first trial; also COD and BOD; further C/N ratio

Action plan:
To arrange for a trial on bigger amounts of paint sludge – also for the sake of production of compost –, i.e. a few hundred kg per sample

First batch:	50% paint sludge and 50% (by weight) fly ash bokashi
Second batch:	50% paint sludge and 50% rice husk bokashi
Third batch:	50% paint sludge and 25% fly ash bokashi and 25% rice husk bokashi
Fourth batch:	50% paint sludge and 16.6% fly ash bokashi and 16.6% rice husk bokashi and 16.6% rice bran bokashi

Each combination as an aerobic and an anaerobic batch, hence totally eight batches. In the anaerobic batches only one mechanical mixing after 20 days (to ensure good mixing of materials). Conditions for all batches: shade, protection from rains; anaerobic conditions to be created simply with the help of plastic sheets.
AuroAnnam to organize supply of fly ash & 4 liters of EM stock solution and 4 kg of organic jaggery to be supplied by AuroAnnam.

We completed the second round of experiment in both aerobic and anaerobic mode and we found very good signs of degradation of the paint sludge and fungal growth is also observed in the anaerobic samples. Currently we are at the analysis stage.

OUR EXPECTATION FROM IIT, Mumbai:
Validation of this entire experiment by:
1. Appropriately advise the team at various stages of this experiment
2. Carrying out analysis for appropriate quality parameters and identify the magnitude of toxicity.
3. Set up analysis to quantify the degradation like C/N ratio etc.
4. Inclusion of other process to immobilize the heavy metals and other toxic components.
5. Over-view the experiments with small pilot plant for degradation.
6. Suggesting a final suitable method of disposal acceptable to regulatory authorities.
7. Scaling of a treatment plant / system for degradation after successful completion of bulk trials.
8. Look into alternate methods like solvent recovery, paint recovery which can be used for secondary applications etc