

定した。図-5~7にRun 3における各分析項目の経時変化を示す。本発酵槽は非連続、非攪拌型であるので、サンプリング孔の高さによって若干の差異が認められる。含水率、発熱減量は、発酵期間中に数%減少した。pHは、発酵終了付近で8.5程度まで上昇した。COD_{cr}、BOD₅は、温度の上昇と共に減少する傾向にあった。C/N比は、若干増加する傾向を示した。なお、これらの指標については、Run 1, 2でもほぼ同様の傾向を示した。表-2に示した熱収支式から発酵過程でのコンポストの温度と発生水量をシュミレートした。使用したパラメーターは、表-

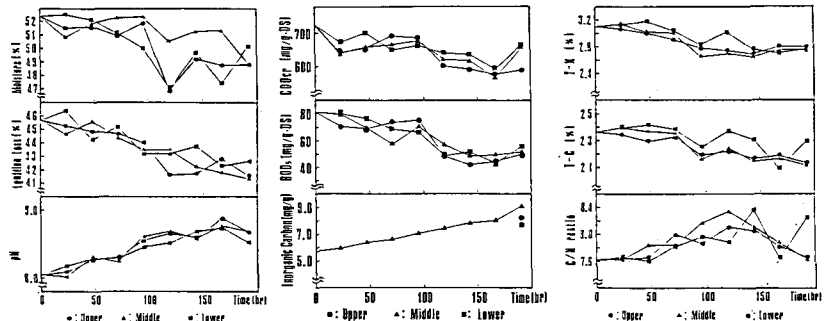


図-5, 6, 7 Run 3の各指標の経時変化

図-5, 6, 7 Run 3の各指標の経時変化。COD_{cr}、BOD₅は、温度の上昇と共に減少する傾向にあった。C/N比は、若干増加する傾向を示した。なお、これらの指標については、Run 1, 2でもほぼ同様の傾向を示した。表-2に示した熱収支式から発酵過程でのコンポストの温度と発生水量をシュミレートした。使用したパラメーターは、表-2に示したとおりである。ここで発酵熱の評価が問題となるが、従来の取扱¹⁾では、呼吸商を1と仮定する場合が多い。しかし、実際の排ガス中のO₂とCO₂を同時測定すると、槽内混合物の性状、操作条件に依存して必ずしも呼吸商は1にはならない。Run 3では、図-8に示すように、見かけの呼吸商は、0.53 (CO₂ mol / O₂ mol) と実測された。そこで、排ガス中の組成で示されるCO₂の他に生成CO₂の一部が汚泥にトラップされていると推定し、汚泥中のICを測定した。その結果、槽内混合物中のICは、発酵の進行と共に増加し(図-6, 下)、最終的には、槽内全体として約69gのICの増加が実測された。さらに発生水中のICとして、約6.6gが溶け込んでいることが実測された。そこで、これらのIC量を用いて、呼吸商を補正すると、約0.61 (CO₂ mol / O₂ mol) となる。従って、発酵熱をO₂の消費量に0.61を乗じて、106 (kcal / CO₂ mol) を用いて計算すると、図-9に示した実線となり、実測値とよく一致している。また、Run 1, 2についても同様の値を用いて計算すると、それぞれ図-2, 4に示した実線となる。Run 1, 2では、実測による呼吸商を評価することができないが、0.61よりも高いことが予測され、その結果、発酵熱が過少評価となり、発酵温度、発生水量とも過少にシュミレートされているものと思われる。

4. まとめ コンポスト化反応における呼吸商は、コンポスト化条件によって必ずしも1ではない。その為、排ガスのO₂消費量から発酵熱を求めると過大評価となる。また、生成CO₂は汚泥の性状によりかなりトラップされるので、排ガス中のCO₂濃度から求めると過少評価となる。本報では、汚泥および発生水中にトラップされたIC量を実測することによって、見かけの呼吸商を補正して、熱収支式における発酵熱を評価すべきであることを提示した。

<参考文献>

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$\frac{d}{dt} (T_{EC}) = \frac{2AH_1ZAH_2 + dH_1R_1 + dH_2R_2 + dH_3R_3 + dH_4R_4 + dH_5R_5 + dH_6R_6 + dH_7R_7 + dH_8R_8 + dH_9R_9 + dH_{10}R_{10} + dH_{11}R_{11} + dH_{12}R_{12} + dH_{13}R_{13} + dH_{14}R_{14} + dH_{15}R_{15} + dH_{16}R_{16} + dH_{17}R_{17} + dH_{18}R_{18} + dH_{19}R_{19} + dH_{20}R_{20} + dH_{21}R_{21} + dH_{22}R_{22} + dH_{23}R_{23} + dH_{24}R_{24} + dH_{25}R_{25} + dH_{26}R_{26} + dH_{27}R_{27} + dH_{28}R_{28} + dH_{29}R_{29} + dH_{30}R_{30} + dH_{31}R_{31} + dH_{32}R_{32} + dH_{33}R_{33} + dH_{34}R_{34} + dH_{35}R_{35} + dH_{36}R_{36} + dH_{37}R_{37} + dH_{38}R_{38} + dH_{39}R_{39} + dH_{40}R_{40} + dH_{41}R_{41} + dH_{42}R_{42} + dH_{43}R_{43} + dH_{44}R_{44} + dH_{45}R_{45} + dH_{46}R_{46} + dH_{47}R_{47} + dH_{48}R_{48} + dH_{49}R_{49} + dH_{50}R_{50} + dH_{51}R_{51} + dH_{52}R_{52} + dH_{53}R_{53} + dH_{54}R_{54} + dH_{55}R_{55} + dH_{56}R_{56} + dH_{57}R_{57} + dH_{58}R_{58} + dH_{59}R_{59} + dH_{60}R_{60} + dH_{61}R_{61} + dH_{62}R_{62} + dH_{63}R_{63} + dH_{64}R_{64} + dH_{65}R_{65} + dH_{66}R_{66} + dH_{67}R_{67} + dH_{68}R_{68} + dH_{69}R_{69} + dH_{70}R_{70} + dH_{71}R_{71} + dH_{72}R_{72} + dH_{73}R_{73} + dH_{74}R_{74} + dH_{75}R_{75} + dH_{76}R_{76} + dH_{77}R_{77} + dH_{78}R_{78} + dH_{79}R_{79} + dH_{80}R_{80} + dH_{81}R_{81} + dH_{82}R_{82} + dH_{83}R_{83} + dH_{84}R_{84} + dH_{85}R_{85} + dH_{86}R_{86} + dH_{87}R_{87} + dH_{88}R_{88} + dH_{89}R_{89} + dH_{90}R_{90} + dH_{91}R_{91} + dH_{92}R_{92} + dH_{93}R_{93} + dH_{94}R_{94} + dH_{95}R_{95} + dH_{96}R_{96} + dH_{97}R_{97} + dH_{98}R_{98} + dH_{99}R_{99} + dH_{100}R_{100} + dH_{101}R_{101} + dH_{102}R_{102} + dH_{103}R_{103} + dH_{104}R_{104} + dH_{105}R_{105} + dH_{106}R_{106} + dH_{107}R_{107} + dH_{108}R_{108} + dH_{109}R_{109} + dH_{110}R_{110} + dH_{111}R_{111} + dH_{112}R_{112} + dH_{113}R_{113} + dH_{114}R_{114} + dH_{115}R_{115} + dH_{116}R_{116} + dH_{117}R_{117} + dH_{118}R_{118} + dH_{119}R_{119} + dH_{120}R_{120} + dH_{121}R_{121} + dH_{122}R_{122} + 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dH_{508}R_{508} + dH_{509}R_{509} + dH_{510}R_{510} + dH_{511}R_{511} + dH_{512}R_{512} + dH_{513}R_{513} + dH_{514}R_{514} + dH_{515}R_{515} + dH_{516}R_{516} + dH_{517}R_{517} + dH_{518}R_{518} + dH_{519}R_{519} + dH_{520}R_{520} + dH_{521}R_{521} + dH_{522}R_{522} + dH_{523}R_{523} + dH_{524}R_{524} + dH_{525}R_{525} + dH_{526}R_{526} + dH_{527}R_{527} + dH_{528}R_{528} + dH_{529}R_{529} + dH_{530}R_{530} + dH_{531}R_{531} + dH_{532}R_{532} + dH_{533}R_{533} + dH_{534}R_{534} + dH_{535}R_{535} + dH_{536}R_{536} + dH_{537}R_{537} + dH_{538}R_{538} + dH_{539}R_{539} + dH_{540}R_{540} + dH_{541}R_{541} + dH_{542}R_{542} + dH_{543}R_{543} + dH_{544}R_{544} + dH_{545}R_{545} + dH_{546}R_{546} + dH_{547}R_{547} + dH_{548}R_{548} + dH_{549}R_{549} + dH_{550}R_{550} + dH_{551}R_{551} + dH_{552}R_{552} + dH_{553}R_{553} + dH_{554}R_{554} + dH_{555}R_{555} + dH_{556}R_{556} + dH_{557}R_{557} + dH_{558}R_{558} + dH_{559}R_{559} + dH_{560}R_{560} + dH_{561}R_{561} + dH_{562}R_{562} + dH_{563}R_{563} + dH_{564}R_{564} + dH_{565}R_{565} + dH_{566}R_{566} + dH_{567}R_{567} + dH_{568}R_{568} + dH_{569}R_{569} + dH_{570}R_{570} + dH_{571}R_{571} + dH_{572}R_{572} + dH_{573}R_{573} + dH_{574}R_{574} + dH_{575}R_{575} + dH_{576}R_{576} + dH_{577}R_{577} + dH_{578}R_{578} + dH_{579}R_{579} + dH_{580}R_{580} + dH_{581}R_{581} + dH_{582}R_{582} + dH_{583}R_{583} + dH_{584}R_{584} + dH_{585}R_{585} + dH_{586}R_{586} + dH_{587}R_{587} + dH_{588}R_{588} + dH_{589}R_{589} + dH_{590}R_{590} + dH_{591}R_{591} + dH_{592}R_{592} + dH_{593}R_{593} + dH_{594}R_{594} + dH_{595}R_{595} + dH_{596}R_{596} + dH_{597}R_{597} + dH_{598}R_{598} + dH_{599}R_{599} + dH_{600}R_{600} + dH_{601}R_{601} + dH_{602}R_{602} + dH_{603}R_{603} + dH_{604}R_{604} + dH_{605}R_{605} + dH_{606}R_{606} + dH_{607}R_{607} + dH_{608}R_{608} + dH_{609}R_{609} + dH_{610}R_{610} + dH_{611}R_{611} + dH_{612}R_{612} + dH_{613}R_{613} + dH_{614}R_{614} + dH_{615}R_{615} + dH_{616}R_{616} + dH_{617}R_{617} + dH_{618}R_{618} + dH_{619}R_{619} + dH_{620}R_{620} + dH_{621}R_{621} + dH_{622}R_{622} + dH_{623}R_{623} + dH_{624}R_{624} + dH_{625}R_{625} + dH_{626}R_{626} + dH_{627}R_{627} + dH_{628}R_{628} + dH_{629}R_{629} + dH_{630}R_{630} + dH_{631}R_{631} + dH_{632}R_{632} + dH_{633}R_{633} + dH_{634}R_{634} + dH_{635}R_{635} + dH_{636}R_{636} + dH_{637}R_{637} + dH_{638}R_{638} + dH_{639}R_{639} + dH_{640}R_{640} + dH_{641}R_{641} + dH_{642}R_{642} + dH_{643}R_{643} + dH_{644}R_{644} + dH_{645}R_{645} + dH_{646}R_{646} + dH_{647}R_{647} + dH_{648}R_{648} + dH_{649}R_{649} + dH_{650}R_{650} + dH_{651}R_{651} + dH_{652}R_{652} + dH_{653}R_{653} + dH_{654}R_{654} + dH_{655}R_{655} + dH_{656}R_{656} + dH_{657}R_{657} + dH_{658}R_{658} + dH_{659}R_{659} + dH_{660}R_{660} + dH_{661}R_{661} + dH_{662}R_{662} + dH_{663}R_{663} + dH_{664}R_{664} + dH_{665}R_{665} + dH_{666}R_{666} + dH_{667}R_{667} + dH_{668}R_{668} + dH_{669}R_{669} + dH_{670}R_{670} + dH_{671}R_{671} + dH_{672}R_{672} + dH_{673}R_{673} + dH_{674}R_{674} + dH_{675}R_{675} + dH_{676}R_{676} + dH_{677}R_{677} + dH_{678}R_{678} + dH_{679}R_{679} + dH_{680}R_{680} + dH_{681}R_{681} + dH_{682}R_{682} + dH_{683}R_{683} + dH_{684}R_{684} + dH_{685}R_{685} + dH_{686}R_{686} + dH_{687}R_{687} + dH_{688}R_{688} + dH_{689}R_{689} + dH_{690}R_{690} + dH_{691}R_{691} + dH_{692}R_{692} + dH_{693}R_{693} + dH_{694}R_{694} + dH_{695}R_{695} + dH_{696}R_{696} + dH_{697}R_{697} + dH_{698}R_{698} + dH_{699}R_{699} + dH_{700}R_{700} + dH_{701}R_{701} + dH_{702}R_{702} + dH_{703}R_{703} + dH_{704}R_{704} + dH_{705}R_{705} + dH_{706}R_{706} + dH_{707}R_{707} + dH_{708}R_{708} + dH_{709}R_{709} + dH_{710}R_{710} + dH_{711}R_{711} + dH_{712}R_{712} + dH_{713}R_{713} + dH_{714}R_{714} + dH_{715}R_{715} + dH_{716}R_{716} + dH_{717}R_{717} + dH_{718}R_{718} + dH_{719}R_{719} + dH_{720}R_{720} + dH_{721}R_{721} + dH_{722}R_{722} + dH_{723}R_{723} + dH_{724}R_{724} + dH_{725}R_{725} + dH_{726}R_{726} + dH_{727}R_{727} + dH_{728}R_{728} + dH_{729}R_{729} + dH_{730}R_{730} + dH_{731}R_{731} + dH_{732}R_{732} + dH_{733}R_{733} + dH_{734}R_{734} + dH_{735}R_{735} + dH_{736}R_{736} + dH_{737}R_{737} + dH_{738}R_{738} + dH_{739}R_{739} + dH_{740}R_{740} + dH_{741}R_{741} + dH_{742}R_{742} + dH_{743}R_{743} + dH_{744}R_{744} + dH_{745}R_{745} + dH_{746}R_{746} + dH_{747}R_{747} + dH_{748}R_{748} + dH_{749}R_{749} + dH_{750}R_{750} + dH_{751}R_{751} + dH_{752}R_{752} + dH_{753}R_{753} + dH_{754}R_{754} + dH_{755}R_{755} + dH_{756}R_{756} + dH_{757}R_{757} + dH_{758}R_{758} + dH_{759}R_{759} + dH_{760}R_{760} + dH_{761}R_{761} + dH_{762}R_{762} + dH_{763}R_{763} + dH_{764}R_{764} + dH_{765}R_{765} + dH_{766}R_{766} + dH_{767}R_{767} + dH_{768}R_{768} + dH_{769}R_{769} + dH_{770}R_{770} + dH_{771}R_{771} + dH_{772}R_{772} + dH_{773}R_{773} + dH_{774}R_{774} + dH_{775}R_{775} + dH_{776}R_{776} + dH_{777}R_{777} + dH_{778}R_{778} + dH_{779}R_{779} + dH_{780}R_{780} + dH_{781}R_{781} + dH_{782}R_{782} + dH_{783}R_{783} + dH_{784}R_{784} + dH_{785}R_{785} + dH_{786}R_{786} + dH_{787}R_{787} + dH_{788}R_{788} + dH_{789}R_{789} + dH_{790}R_{790} + dH_{791}R_{791} + dH_{792}R_{792} + dH_{793}R_{793} + dH_{794}R_{794} + dH_{795}R_{795} + dH_{796}R_{796} + dH_{797}R_{797} + dH_{798}R_{798} + dH_{799}R_{799} + dH_{800}R_{800} + dH_{801}R_{801} + dH_{$
