

FOCUS ON: [CATALYST SCREENING // HEL WINS PRESTIGIOUS AWARD // POWER OF OFF-GAS ANALYSIS // EVENTS ]

## CATalyst Screening - With The HEL PolyCAT

The **PolyCAT** has been designed to be an affordable entry level system into true, parallel catalytic screening - bridging the gap between simple manual units and high end, fully automated systems. Although the system is relatively low cost, the **PolyCAT** offers a wealth of powerful features:

- | Independent automated control of temperature and agitation in each and every reactor
- | Independent, manual control of pressure in each reactor
- | Choice of high pressure reactor sizes from 16 ml to 300 ml
- | Up to 8 completely independently controlled high pressure reactors can be processed simultaneously
- | Powerful software controls, monitors and logs all automated features
- | Compact footprint means the **PolyCAT** can fit in any standard hood and operates quietly and unobtrusively



HEL 8 reactor PolyCAT

Download our full brochure

[bit.ly/polyCAT8](http://bit.ly/polyCAT8)

For enhanced control and advanced automation, our flagship screening system, [High Pressure ChemSCAN II](#), includes fully automated pressure monitoring and gas management.

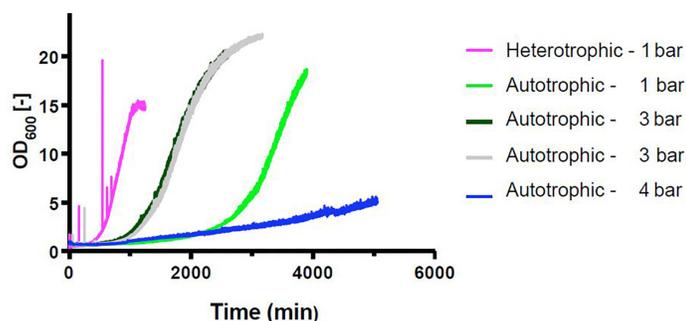
## HEL Wins BIV Awards In Collaboration With University Of Sheffield

Most fermentation studies are carried out under ambient pressure. Although pressurized fermentation has been widely applied in brewing industry to reduce the production of yeast ester and fusel alcohol for better flavor and aroma control, there is no systematic study of the effects of elevated pressure on bacterial growth, cell viability and productivity of C1 gas organisms such as *C. necator* H16.

The BIV award was used to start research to investigate the effect of pressure on the growth of *C. necator* H16 during fermentation:

- (a) under heterotrophic cultivation conditions
- (b) under autotrophic cultivation conditions

A snapshot of the results are shown below, where increase in optical density (as a measure of bacterial growth) is plot as a function of time. The heterotrophic growth with Gluconate as the carbon is compared with autotrophic growth based on H<sub>2</sub>, CO<sub>2</sub> and air feed, at 1, 3 and 4 bar. The improvement from 1 to 3bar is clear but further increase in pressure further did not continue the trend.



The reactor was equipped not only with HEL's optical density probe but also with an FTIR from Bruker and an Aber probe to monitor viable cell density. The objective is to continue this work in 2019 and develop the technology further.

The experiments were done at HEL's laboratory in Borehamwood, using a BioXplorer 400 system, with a 500ml bioreactor, rated to 10 bar, under the direction of Dr Kang Lan Tee (supervised by Dr Tuck Seng Wong) of Sheffield University.

## The Power of Off-Gas Analysis for Real-Time Process Control

Off-gas analysis is an on-line tool that can be used to monitor and control a process continuously. It measures oxygen and carbon dioxide concentrations in the exhaust air of the reactor. If the amount of oxygen inserted into the fermenter is quantified via gas-flow control, off-gas analysis provides information about the oxygen uptake rate (OUR) of the cultivated cells. Simultaneously, the carbon dioxide production rate (CPR) can be measured for micro-organisms. From this data, the respiration quotient (RQ), the ratio of formed CO<sub>2</sub> to consumed O<sub>2</sub>, can be calculated. Changes in RQ indicate significant changes in the fermentation process. There are many reasons for this change including the substrate is limiting or not utilized anymore, oxygen supply is insufficient and anaerobic metabolism has started, or the organism is ready to consume the substrate for production in the secondary metabolism.

The Tandem Off-gas analyzer should be part of any single or multi bioreactor set up and although it is often used to monitor biomass, growth rate, substrate consumption, and thus product formation, it can also be used for DO-probe functionality, upscaling experiments, or for documenting sterility tests.



The BioXplorer 100 & Tandem PRO Gas Analyzer



The Complete Range Of Gas Analyzers

### Events: More At <https://www.helgroup.com/events/>

**27th-29th March**  
36th SCI Process Development Symposium

Further details  
<http://bit.ly/2DNsnNi>

Location: Manchester, UK

**14th-16th May**  
Continuous Flow Technology IV

Further details  
<http://bit.ly/2DMDOF9>

Location: Manchester, UK

**18th-23rd August**  
EuropaCat 2019

Further details:  
<http://bit.ly/2DMt09V>

Location: Basel, Switzerland

