Acquisition of Synthetic Zeolite Processing Technology

13.05.20

ASX:MSE

MetalSearch

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About Metalsearch

Aspiring Industrial Mineral and Compound Producer

- Developing new kaolin centric technologies for in demand compounds
- Leveraging MSE's kaolin feedstock into new high-tech products

Successful Abercorn drilling program delivers High Grade Al_2O_3

Targeted Kaolin marketability program to be undertaken

- UQ engaged to undertake Abercorn kaolin halloysite testing
- ISO Brightness

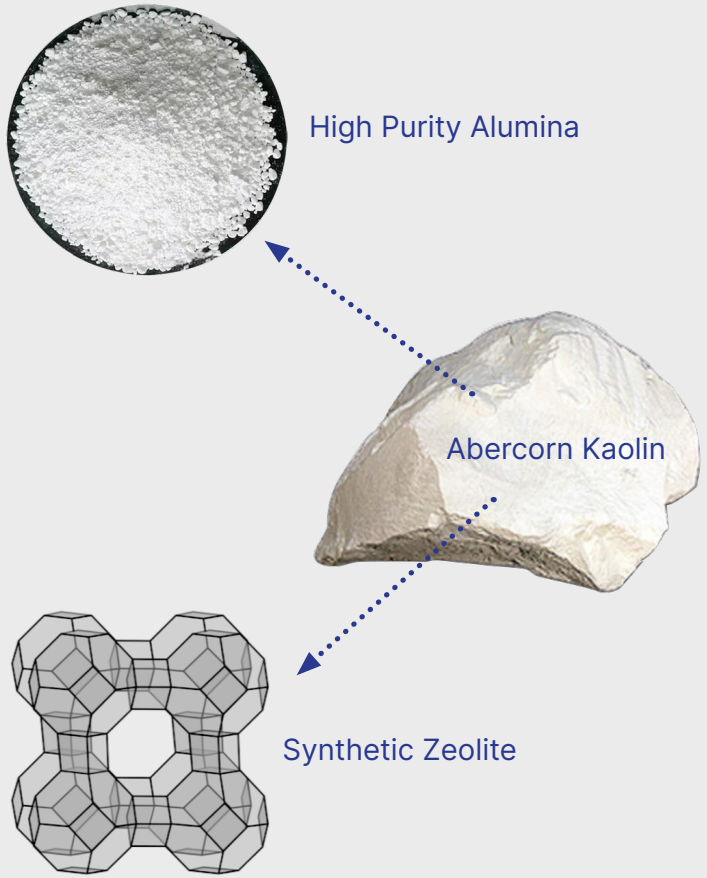
The University of Queensland (UQ) – Chemical Engineering Partnership Enhanced

- HPA (provisional patent lodged)
  - production process studies underway
- **Secured Global Synthetic Zeolite licence** (provisional patent lodged)
  - research agreement executed – program to commence 1st June 2020

Build an Experienced Team – foundation forming

(New) COO Engagement – Executive now in place

- Drive execution of fast track commercialisation strategy
- Establish operational platform for the company

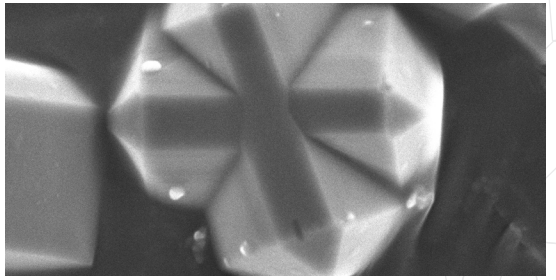


What are Synthetic Zeolites

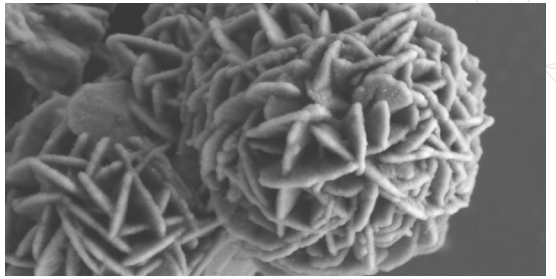
Synthetic zeolites are manufactured aluminosilicate minerals with a sponge-like structure (frameworks), made up of tiny pores that make them useful as catalysts or ultrafine filters. They are commonly known as molecular sieves and can be designed to selectively adsorb molecules or ions.

- **Applications include:**
  - Separation and purification ie Water treatment
  - Detergent builder (water softener)
  - Cracking processes ie Petroleum industry
  - Pharmaceutical industry
  - Agricultural industry ie soil conditioning
- The selectivity properties of different synthetic zeolites enable them to be effective in wastewater treatment applications, water filters and as ion exchangers in many everyday dishwashing and laundry detergents, assisting to remove calcium and magnesium and thereby softening water so they work more effectively.
- Key industrial relevant frameworks include Type A, Type X, ZSM, Type Y and Ultrastable Y

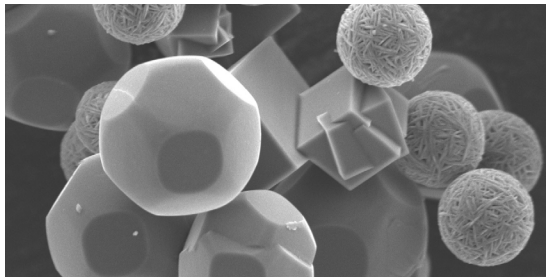
Images: UQ PhD student Dilini Seneviratne



Zeolite Type A



Sodalite flower



Zeolite 4A, Sodalite and Zeolite LTN

Synthetic Zeolite market

Market data reflect specialised industrial commodity = multiple products

- **Verified Market Research[1] Global Market size of Synthetic Zeolite Market:**
  - 2018: $5.45 billion USD
  - 2019: $5.58 billion USD
  - 2026: $6.80 billion USD
- UQ IP has successfully produced Type A, Type X and ZSM
- Type A framework represents the largest segment and one UQ tech has synthesised
- MSE objective is to target applications that IP can deliver material cost advantage
  - JV manufacturing &/or Co-operation agreements (near term)
  - Direct sale of manufactured product(s) (longer term)

1. Verified Market Research – Global Synthetic Zeolite Market Size & Forecast to 2026

Global Synthetic Zeolites Market, by Product (USD Million)

By Product	2017	2018	2019	2026	CAGR%
Zeolite A	3,345.6	3,427.3	3,512.1	4,308.1	2.96%
Zeolite X	621.3	637.6	654.7	820.4	3.28%
Zeolite Y	468.1	478.2	488.7	588.9	2.70%
Zeolite Zsm-5	515.7	525.6	535.9	633.9	2.43%
Others	377.7	384.5	391.5	458.3	2.28%
Total	**5,328.5**	**5,453.3**	**5,583.0**	**6,809.6**	**2.88%**

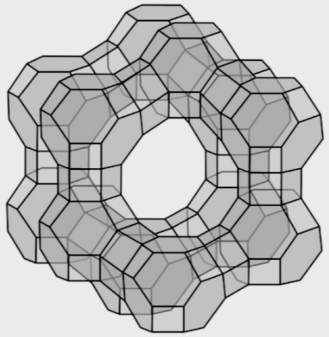
Global Synthetic Zeolites Market, by Product (USD Million)

By Application	2017	2018	2019	2026	CAGR%
Detergents	3,260.6	3,337.7	3,417.	4,169.1	2.88%
Catalysts	962.0	986.1	1,011.1	1,251.7	3.10%
Adsorbents	779.9	797.5	815.7	990.2	2.81%
Others	326.0	332.1	338.4	398.6	2.37%
Total	5,328.5	5,453.3	5,583.0	6,809.6	2.88%

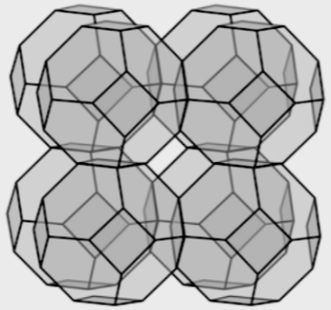
How are they used

The selectivity properties of synthetic zeolites enable them to be extremely effective in **wastewater treatment applications**.

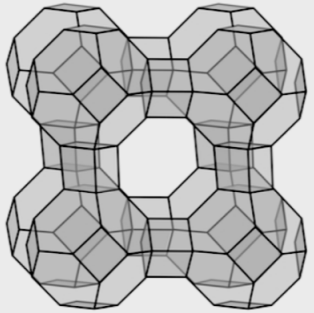
- Rising environmental concerns regarding wastewater health hazards have triggered regulatory bodies across the globe to mandate the use of synthetic zeolite based adsorbents.
- The selectivity makes synthetic zeolites environmentally effective in water treatment applications, as they can be applied to **polluted water**.
- One of the largest uses of synthetic zeolites are as **water softeners** and **water filters**.
- They act as a ion-exchanger in many everyday **dishwashing** and **laundry detergents** to remove calcium, magnesium and soften water, so they work more effectively.
- Another important use for synthetic zeolites is as catalysts in **pharmaceutical drug production** and in the **petroleum industry**, where they're used in catalytic crackers to break large hydrocarbon molecules into gasoline, diesel, kerosene and waxes – it is the porous sponge like structure that facilitates the process.
- MSE and the novel technology developed by UQ has the potential to materially lower the cost of synthetic zeolite production.



Sodalite



Zeolite A



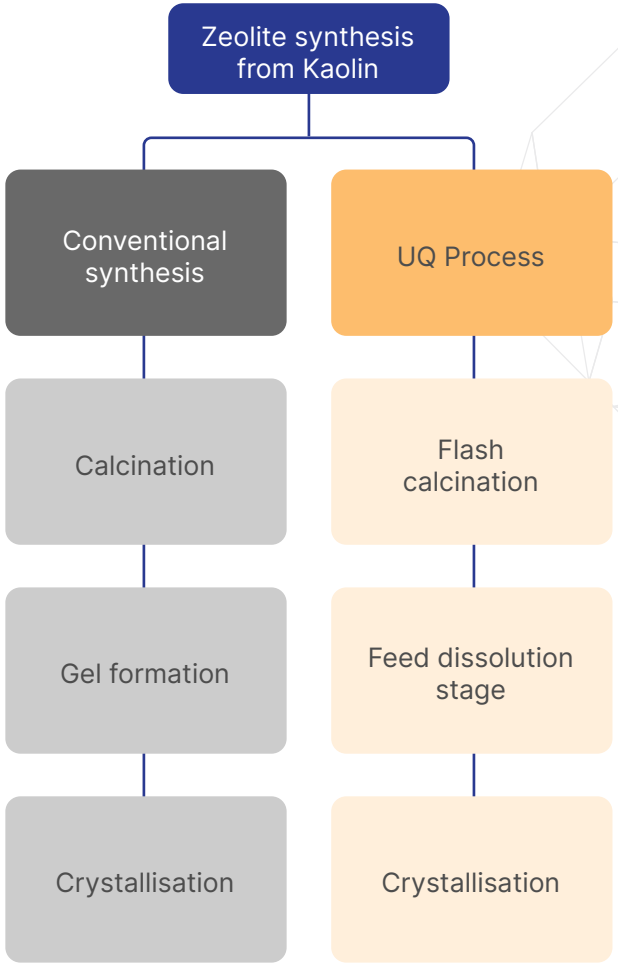
Faujasite

UQ IP advantage

UQ Chemical Engineering lab test work has delivered exciting results which could disrupt conventional manufacturing process, by materially reducing production costs.

- The UQ Chemical Engineering team has demonstrated (under lab scale tests):
  - **Up to 70% reduction in energy consumption in the thermal activation stage**
  - **Up to 80% reduction in production time in the subsequent zeolite precipitation steps**
- The Process offers material environmental benefits verses conventional method
  - Less Energy
  - **Significant reduction in toxic waste**
  - Originally developed as a remediation solution for mine tailings

Provisional Patent lodged June 2019

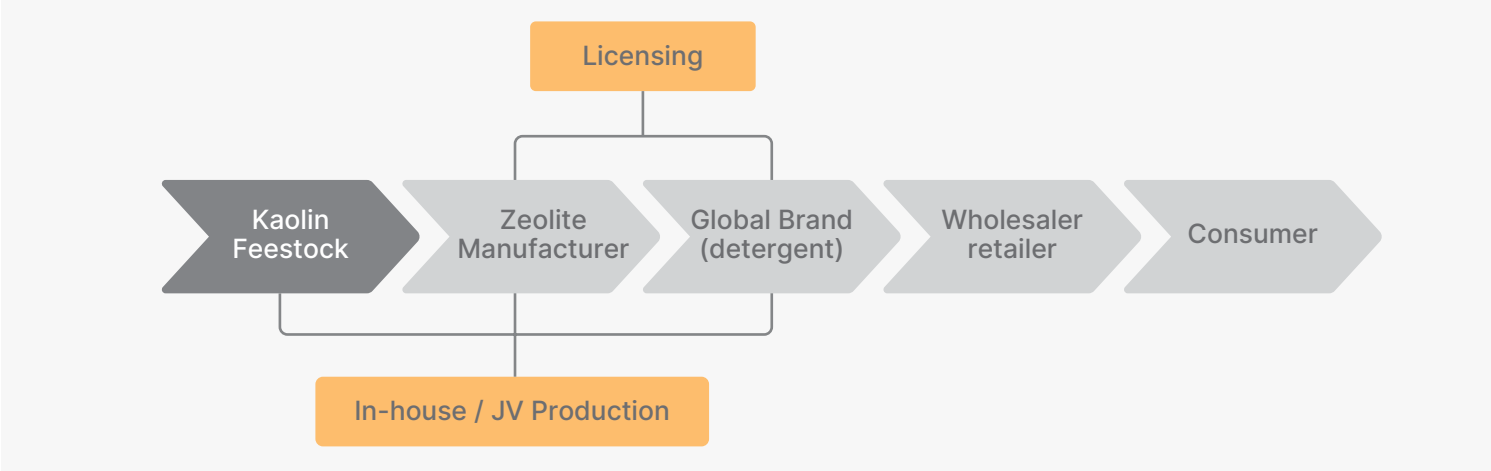


Supply chain advantage

Production cost benefit is compelling

- lower manufacturing costs (energy)
- obtain high ecolabel index (detergent)
- reduce carbon footprint in supply chain (vertical environment proposition)
- materially reduce production time (improve plant productivity and logistics)

Applicable across multiple verticals: Detergent Builders, Soil Conditioners and Water Treatment Solutions




Water Treatment


Detergent Builder


Soil Conditioner

Exclusive global licence

Benefits to Metalsearch shareholders

- Potential fast-track commercialisation
- Diversifying Abercorn Kaolin's feedstock application (vertical integration)
- Securing cost disruptive IP synergetic to MSE market proposition
- Simple process = Lower CapEx
- UQ Partnership strengthened = enhanced technical delivery
- Potential licensing agreements with existing manufactures and end users

Exclusive Global Licence Agreement

- Inventor = Researchers at The University of Queensland (UQ)
- Field = The production of Zeolites for all Applications
- Term = 20 years, or expiration last patent granted in any country
- UniQuest (the technology transfer company of UQ) a substantial shareholder in MSE
- Accelerated research and pilot plant budgets provided by UQ / UniQuest
- Technical Performance Share milestones embedded in agreement
- Licence offers clear Intellectual Property Rights transfer trigger

UNIQUEST

Metalsearch

Board of Directors and Management

Keong Chan

B.Comm MICLA

Non-Executive Chairman

Mr Chan spent his early career working with PWC Australia and Deloitte in Canberra, Sydney and Perth and has significant corporate experience in capital raisings, initial public offerings, mergers and acquisitions, and takeovers and divestments. Mr Chan has also been a director on the Boards of a number of ASX listed companies and has accumulated a vast network of relationships across a number of industries, bringing these connections and his expertise to his role.

John Goody

Non-Executive Director

John is a Member of the Australian Geological Society with over 45 years' experience in minerals exploration in Australia and overseas. He was a founding director of Aeon Metals Ltd (ASX: AML) and is currently a director of minerals exploration company Cobalt Queensland Pty Ltd. John brings a high level of technical expertise and deep understanding of Metalsearch's Abercorn Project.

Robert Downey

B.Ed., LL.B (Hons)

Non-Executive Director

Mr Robert Downey is a qualified solicitor who has practised mainly in the areas of international resource law, corporate law and initial public offerings, as well as mergers and acquisitions. He has extensive experience as an advisor, founder and director of various ASX, TSX and AIM companies. Mr Downey is currently a partner at Dominion Legal, a boutique law firm in Perth.

Peter Zardo

Chief Operating Officer

Mr Zardo has been a high performing banking director, with the Westpac Group for over 16 years. During his tenure, Peter provided strategic guidance and business advice to large corporates. Prior to an accomplished banking career, he spent several years in equity markets, supporting listed companies with capital raisings and investor relations. He has undertaken studies in Applied Science at Charles Sturt University and is a member of the Institute of Company Directors.

Shares on Issue	1,176,551,184
Performance Rights	200,000,000
Options (unlisted)	20,000,000
Share Price	$0.01
Market Capitalisation (fully diluted)	$13.96m
Cash at 31 Mar 2020	$2.34m

Next steps

- Complete final assessment of 62 hole Abercorn assays (results to date confirm high grade Al_2O_3)
- Commence halloysite investigation testing on 80+ Abercorn kaolin samples
- Mainland China synthetic zeolite manufacturer and end user research (early potential marketing) program currently in progress
- File Patent Cooperation Treaty (PCT) for zeolite mineral processing technology
- Undertake zeolite mineral processing technology industry partner collaboration investigations

Bright white Abercorn kaolin

Thank you

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