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Industrial Mineral Forums & Research Ltd

SUMMARY SLIDE DECK

#OilfieldMinerals

OILFIELD MINERALS & MARKETS FORUM HOUSTON 2019

Hilton Houston Post Oak, Houston, 10-12 June 2019

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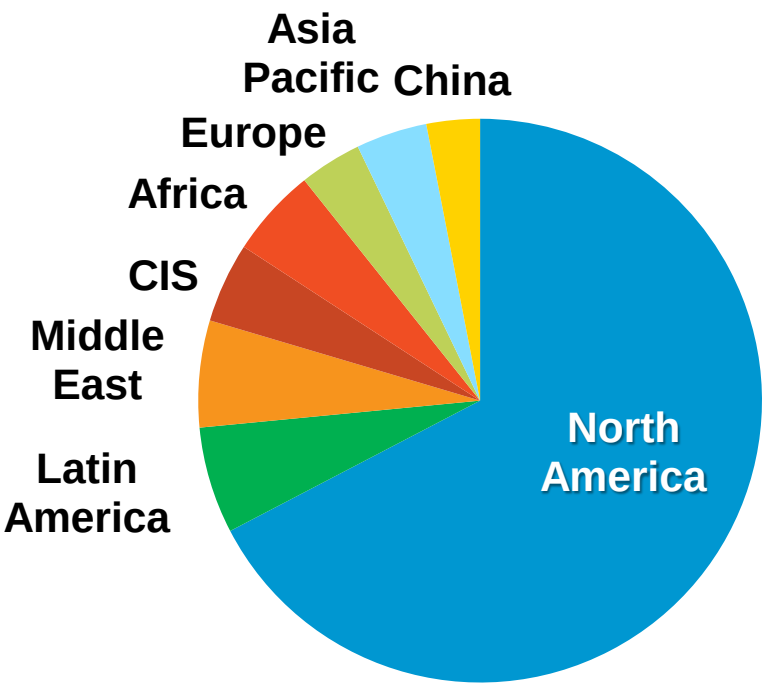
Industrial minerals & the oilfield market

A wide range of vital applications

- Drilling
- Well cementing
- Stimulation
- Production
- Surface prep/cleaning

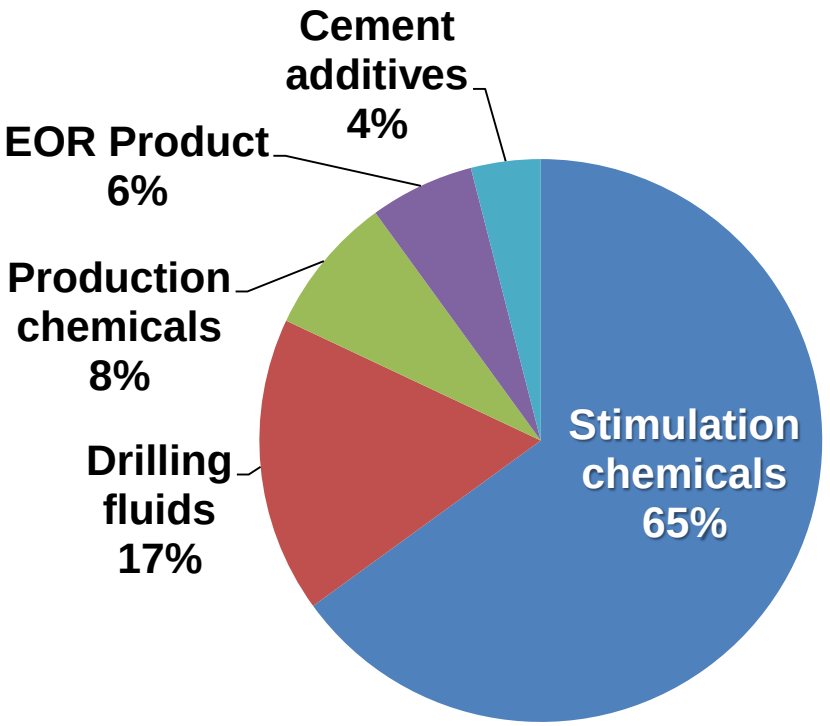
Industrial minerals & the oilfield market

Oilfield chemicals market: regionial share by value



Source: IHS Markit 2017

Oilfield chemicals market: share by type



Source: IHS Markit 2018

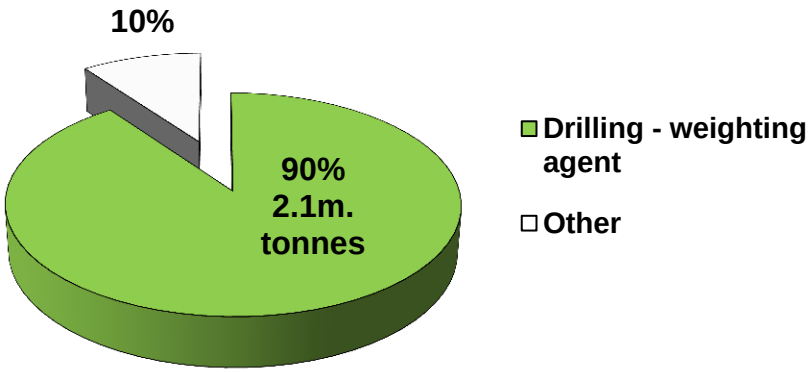
World market for “oilfield chemicals” projected to grow at AAGR of about 4% 2017–22

Industrial minerals & the oilfield market

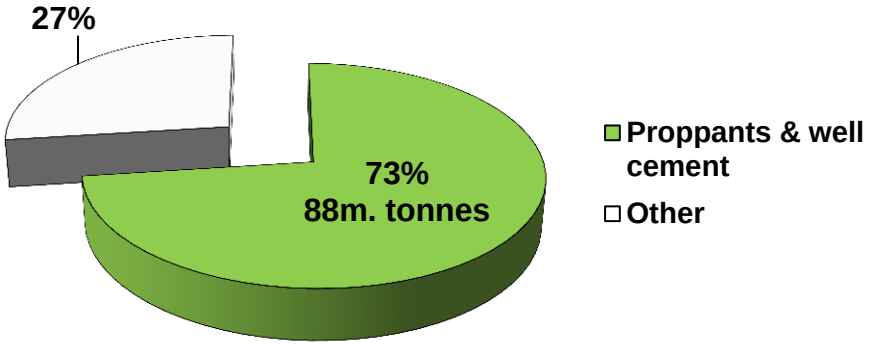
Major volume minerals

As consumed in USA

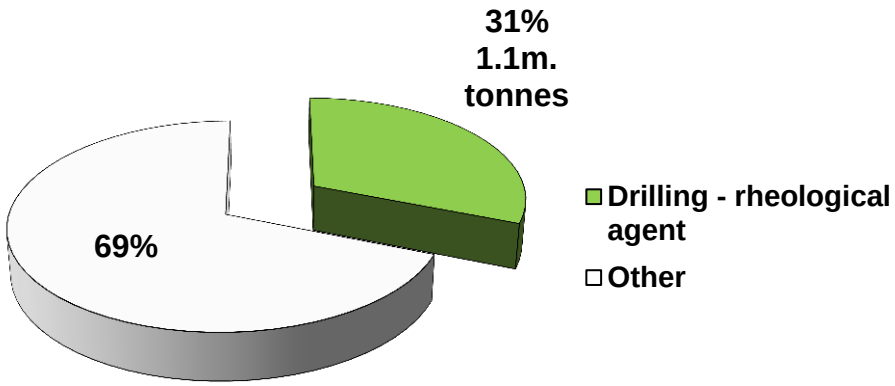
Barite



Silica sand



Bentonite

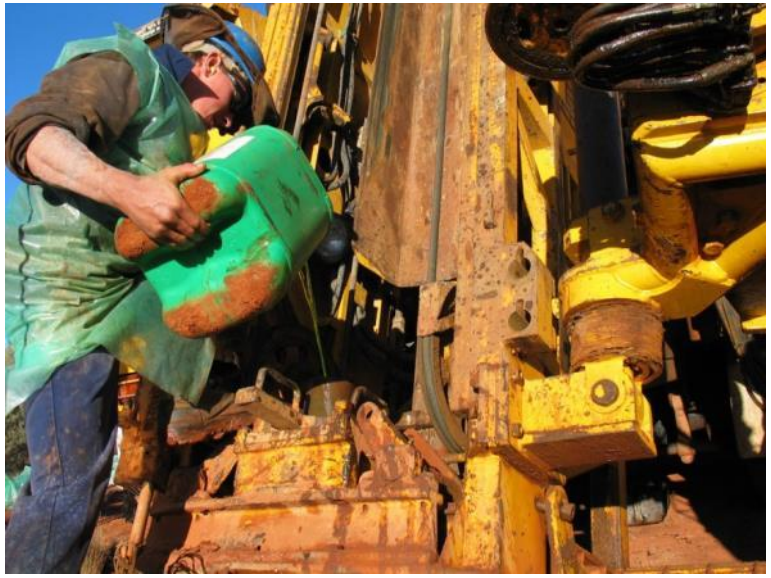


Source: USGS 2019

Industrial minerals & the oilfield market

A wide range of minerals used

Attapulgite
Barite
Bauxite
Bentonite
Borates
Calcium carbonate
Calcium chloride
Diatomite
Garnet
Gilsonite
Graphite
Gypsum
Haematite
Hectorite
Ilmenite
Iron oxide
Kaolin



Lignite
Lime
Magnesia
Magnesium silicate
Magnesium chloride
Mica
Perlite
Potassium chloride
Salt
Sepiolite
Silica sand
Soda ash
Sodium silicate
Vermiculite
Zinc oxide
Zirconia

Industrial minerals & the oilfield market

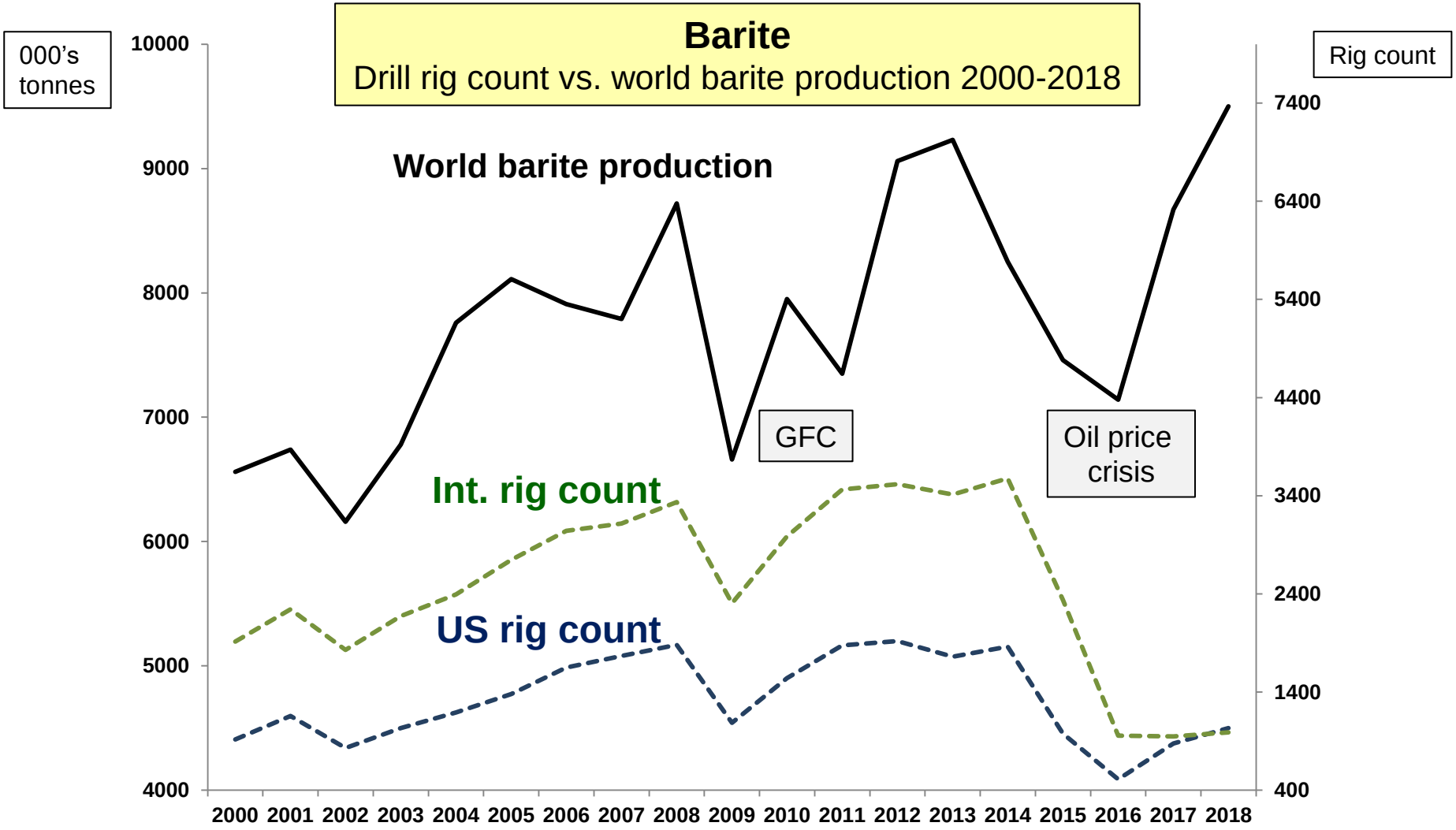
For a wide range of applications

Function	Mineral
Weighting agents high SG; help offset pressure; control liquid flow into wellbore from formation; keep the hole open	**barite, haematite, calcium carbonate**
Bridging agents plug pore spaces at wellbore, restricting invasion of solids and fluids into the formation	**calcium carbonate, salt**
Viscosifiers Carry cuttings to surface; build a cake against permeable formations; lubricates drill string.	**sodium bentonite, treated calcium bentonite for freshwater muds; attapulgite and sepiolite for saltwater muds; organophillic clays for oil muds**
Stabilisers Prevents dissolution of formation	**Gilsonite, salt, gypsum, asphalt**

Industrial minerals & the oilfield market

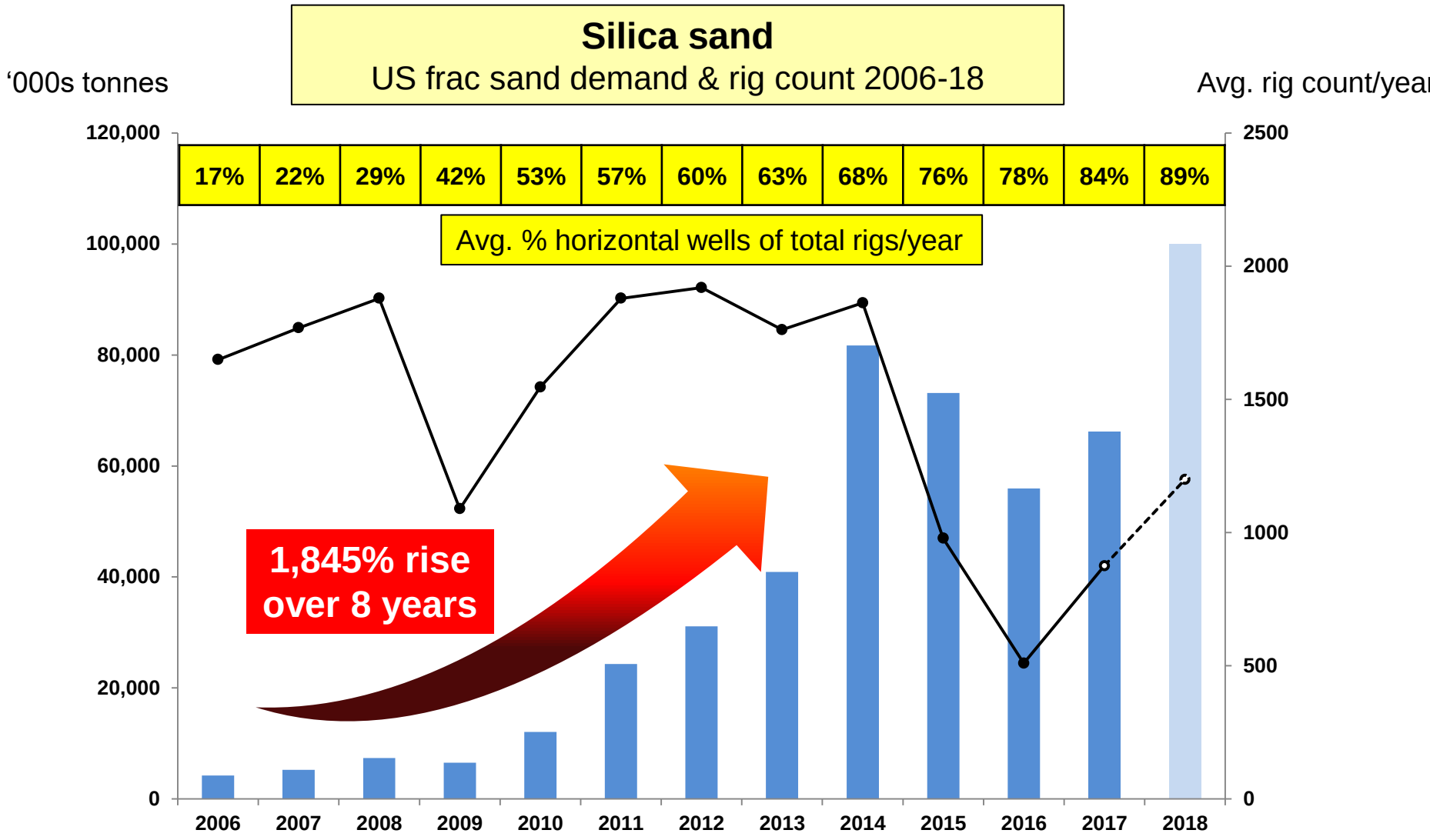
Function	Mineral
Lost circulation materials used to plug or seal pores and cracks in the formation	**Gilsonite, mica, diatomite, calcium carbonate, lignite, expanded perlite & vermiculite (bentonites, organophilic clays)**
Cross-linker Hydrated polymers or gels (guar gum) are cross linked by borate ions to provide increased viscosity. Benefits include, good proppant transport, stable fluid rheology at high temperatures, low fluid loss, and good clean up properties.	**sodium borates**
Lubricants Lubrication of drill bit and drill pipe	**graphite, bentonite, asphalt**
Proppants Hold open fractures to enable oil and gas flow (conductivity)	**silica sand, calcined bauxite, calcined kaolin, magnesium silicate**

Industrial minerals & the oilfield market



Data sources: USGS; Baker Hughes

Industrial minerals & the oilfield market



Welcome Reception

OILFIELD MINERALS & MARKETS FORUM HOUSTON 2019

EXCALIBAR MINERALS LLC

Programme – Tuesday Morning

INTRODUCTION & OVERVIEWS

09.00 **Introduction & Overview**
Ismene Clarke, Director & Mike O'Driscoll, Director, IMFORMED, UK

09.30 **Outlook for oil and gas supply and demand**
Uday Turaga, CEO, ADI Analytics Inc., USA

10.00 **Oilfield mineral demand from an end user's perspective**
Paul D. Scott, Drilling Fluids Specialist, ConocoPhillips, USA

10.30 COFFEE

LOGISTICS

11.30 **Shipowners' unexpected slow start of 2019, will it recover? And what impact will IMO2020 have on freight rates?**
Erik Myklebust, Chartering Manager & Jesper Hoppe, Managing Director, Viking Shipping Co. AS, Norway

12.00 **Impact on barite and bentonite shippers from changes in North American truck and rail**
Richard Dodd, President, RDC Logistics, USA

12.30 LUNCH

Programme – Tuesday Afternoon

PROPPANTS

14.00 **North American proppant market outlook**
Samir Nangia, Managing Director, Capital Markets, IHS Markit, USA

14.30 **Ceramic proppant development, production & market in India**
Ajay Kumar Dasgupta, Managing Director, Hallmark Minerals (I) Pvt Ltd, India

15.00 COFFEE

Roundtable Networking Session

15.15 Tuesday 11 June 2019 Ballroom A/B

No.	Theme	Host
1.	**Exploration**	Ken Santini, Managing Director, Santini & Associates
2.	**Barite**	John Newcaster, Principal, IMPACT Minerals
3.	**Proppants**	Samir Nangia, Managing Director, Capital Markets Brandon Savisky, Snr. Research Analyst, IHS Markit
4.	**Processing**	Kyle Flynn, Director, ST Equipment & Technology
5.	**Logistics**	Richard Dodd, President, RDC Logistics
6.	**Drilling Fluids & Additives**	Paul D. Scott, Drilling Fluids Specialist, ConocoPhillips Dario Montes, Technical Director, American Gilsonite

Evening Reception

17.00 Tuesday 11 June 2019

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Programme – Wednesday Morning

BARITE: OVERVIEW | MEXICO | SOUTH AMERICA

09.00 **Global barite market overview**
John Newcaster, Principal, IMPACT Minerals LLC, representing The Barytes Association, USA

09.30 **Mexican barite and oil & gas markets overview**
Paloma Ruiz Maté, Director General, CIMBAR Mexico & Latin America, Mexico

10.00 **Barite developments in South America**
Santiago Carassale, Baroid Grinding Plant Manager, Halliburton, Argentina

10.30 Barite from Pakistan: profile of Anzer Enterprises
Arhum Qureshi, Managing Director, Anzer Enterprises, Pakistan
presented by Mike O'Driscoll, IMFORMED, UK

10.40 COFFEE

Programme – Wednesday Morning

BARITE & PROCESSING DEVELOPMENTS

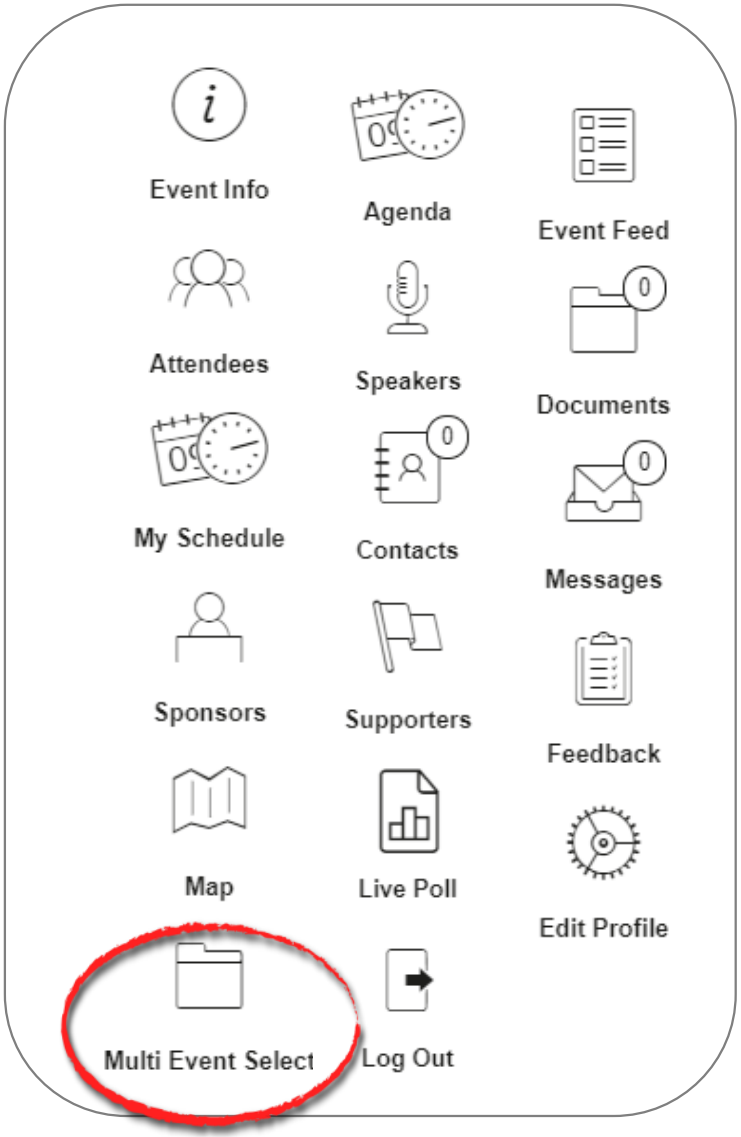
11.30 **Barite as by-product from the polymetallic Palmer Mine Project, Alaska – a potential new, price competitive US source**
Darwin Green, Vice President Exploration, Constantine Metal Resources Ltd, USA

12.00 **Water-free electrostatic processing of oilfield minerals**
Kyle Flynn, Director, Business Development, ST Equipment & Technology LLC, USA

12.30 **New grinding technology for ultrafine oilfield minerals & mobile system**
AJ DeCenso, President, Preferred Process Solutions LLC, USA

13.00 LUNCH & CLOSE OF CONFERENCE

Download our App



Attending Companies

Attending Companies

OILFIELD MINERALS & MARKETS FORUM HOUSTON 2019

Anglo Pacific Minerals
Baramin
Baribright International Inc
Barit Maden Turk A.S
BASO Global
Bentonite Performance Minerals
Broychim
Carbograf
Celtic Marine & Logistics
Cimbar Mexico
CIMBAR Performance Minerals
ConocoPhillips
Constantine Metals Resources
Consultant
Corpomin
D Energy Brasil Holdings
Emprada Mines & Minerals
Excalibar
Gimpex
Global Minerals Barite
Guizhou Tianhong Mining
Halliburton
Hallmark Minerals Pvt Ltd
I.H.S Markit
IMFORMED Ltd
IMPACT Minerals LLC
INDUMIN Group SA de CV
Industrial Project Solutions
International Earth Products
JR Consulting
Leonardite Products
Lhoist
M/G Transport Services
Manuchar Argentina
Manuchar Inc
Mekong Minerals Co Ltd
Milwhite Inc
MinChem International Inc
Mine Feuerfest GmbH
National Oilwell Varco
Nedmag BV
Netzsch Premier Technologies
Neuman & Esser
Newpark Drilling Fluids
Norvic Shipping
Oberon Minerals LLC
Omya Inc
Omya International AG
Omya Madencilik A.S
Outlook General Trading
Pacific Chartering Services Inc
Perfobar
Poittemill
Preferred Process Solutions LLC
Prince Energy LLC
Prodexa de Mexico, S.A. De C.V
Qmax
RDC Logistics
Revelle Shipping Agency Inc
Rheo Minerals
RockFin Minerals
Rua Bulgaria
Santini & Associates Inc
Schenck Process Raymond BN
Schlumberger
Sea White SA
SNUMM
Southwest Land & Minerals Corp
ST Equipment & Technology LLC
Steinbock Barite Ltd
Superior Weighting
Texan Shale Chemicals
Tolsa Wyoming Bentonite
US Geological Survey
Viking Shipping Co. AS
Wuxi Ding Long Minerals Co. Ltd

This was my first year attending the conference and I can't begin to tell how much information and gifted knowledge I was able to bring back with me.
Jennifer Benefield, Sr. Category Specialist, Halliburton, USA

Well thought out and valuable programme, and well organised. I'm a believer in consistent improvement, but can't think of anything to improve, everything was great!
Serra Sarp, General Manager, Barit Maden Turk AS, Turkey

Great programme content with knowledgeable presenters, comfortable venue with ability to hold meetings, app a very good idea.
Jason Lilly, USA Supply Chain Manager, Qmax, USA

Compliments to your organisation for an exceptional conference in Houston. All are doing a fantastic job. Your focus on logistics is important to the industry, well done.
Martin Faubion, Logistics Manager, Pacific Services Inc., USA

Thanks for your hospitality and organising a great event in Houston. We had a great time and met wonderful people during the event.
Ajay Kumar Dasgupta, Managing Director, Hallmark Minerals (I) Pvt Ltd, India

Excellent programme and venue, on time, well organised.
Alberto Garza, Director, Carbograf, Mexico

I think the roundtables are an excellent addition to the conference.
Michele McRae, Commodity Specialist, USGS, USA

Gallery


Industrial Project Solutions
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MINERAL SYSTEMS AND PLANTS


EXPLORATION

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- **Recycling**

MINERAL RECYCLING FORUM 2019

Radisson Blu Hotel, Kraków, 4-6 March 2019

IMFORMED Rendezvous

Les Jardins du Marais, Paris
8-10 April 2019

MAGFORUM 2019

Magnesium Minerals & Markets Conference
Occidental Bilbao, 13-15 May 2019

OILFIELD MINERALS & MARKETS FORUM HOUSTON 2019

Hilton Houston Post Oak, Houston, 10-12 June 2019

OILFIELD MINERALS & MARKETS FORUM HOUSTON 2019

FLUORINE FORUM 2019

Alcron Hotel, Prague
21-23 October 2019

The premier meeting for the global fluorine minerals & markets business

INDIAN MINERALS & MARKETS FORUM 2019

JW Marriott Mumbai Juhu,
18-20 November 2019
(Field Trip 21-22 November 2019)

India's key industrial minerals, their markets, drivers & outlook

CONFIRMED SPEAKERS | SPONSOR/EXHIBIT OPPORTUNITIES

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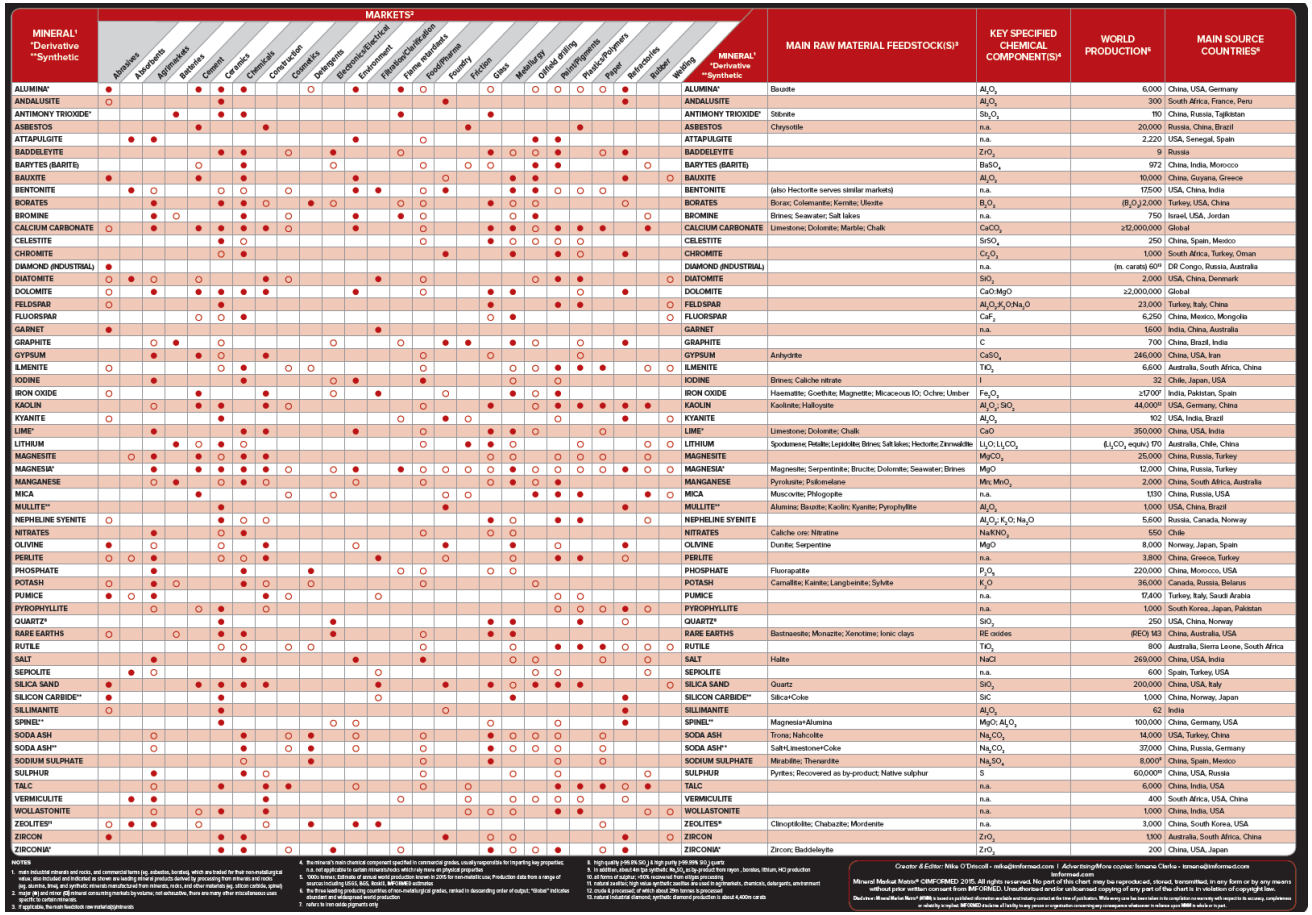
Industrial Mineral Forums & Research

MINERAL MARKET MATRIX®

AT A GLANCE
A-Z GUIDE
WHICH MINERALS
FOR WHICH
MARKETS



MARKETS[2]

MINERAL[1] *Derivative **Synthetic	Abrasives	Absorbents	Agrimarkets	Batteries	Cement	Ceramics	Chemicals	Construction	Cosmetics	Detergents	Electronics/Electrical	Environment	Filtration/Clarification	Flame retardants	Food/Pharma	Foundry	Friction	Glass	Metallurgy	Oilfield drilling	Paint/Pigments	Plastics/Polymers	Paper	Refractories	Rubber	Welding	MINERAL[1] *Derivative **Synthetic	MAIN RAW MATERIAL FEEDSTOCK(S)[3]	KEY SPECIFIED CHEMICAL COMPONENT(S)[4]	WORLD PRODUCTION[5]	MAIN SOURCE COUNTRIES[5]
ALUMINA*	●				●	●	●		○		●			●	○			○		○	○	○	○	●			ALUMINA*	Bauxite	Al_2O_3	6,000	China, USA, Germany
ANDALUSITE	○					●										●								●			ANDALUSITE		Al_2O_3	300	South Africa, France, Peru
ANTIMONY TRIOXIDE*				●		●	●							●				●									ANTIMONY TRIOXIDE*	Stibnite	Sb_2O_3	110	China, Russia, Tajikistan
ASBESTOS					●			●									●					●					ASBESTOS	Chrysotile	n.a.	20,000	Russia, China, Brazil
ATTAPULGITE		●	●								●				○					●	●						ATTAPULGITE		n.a.	2,220	USA, Senegal, Spain
BADDELEYITE						●	●		○			●			○			●	○	○	●		○	●			BADDELEYITE		ZrO_2	9	Russia
BARYTES (BARITE)					○		●				○				○		○	○		●	●				○		BARYTES (BARITE)		$BaSO_4$	972	China, India, Morocco
BAUXITE	●				●		●					●			○				●	●				●		○	BAUXITE		Al_2O_3	10,000	China, Guyana, Greece
BENTONITE		●	○			○	○		○			●		●		○		●	●	○	○	○					BENTONITE	(also Hectorite serves similar markets)	n.a.	17,500	USA, China, India
BORATES			●			●	●	○		●	○			○	○			●	○	○				○			BORATES	Borax; Colemanite; Kernite; Ulexite	B_2O_3	(B_2O_3) 2,000	Turkey, USA, China
BROMINE			●	○			●		○			●		●	○				○	●					○		BROMINE	Brines; Seawater; Salt lakes	n.a.	750	Israel, USA, Jordan
CALCIUM CARBONATE	○		●		●	●	●	●	○			●			○				●	○	●	●	●		●		CALCIUM CARBONATE	Limestone; Dolomite; Marble; Chalk	$CaCO_3$	≥12,000,000	Global
CELESTITE						●	○								○				●	○	○	○					CELESTITE		$SrSO_4$	250	China, Spain, Mexico
CHROMITE						○	●									●			●		●	○		●			CHROMITE		Cr_2O_3	1,000	South Africa, Turkey, Oman
DIAMOND (INDUSTRIAL)	●																		●								DIAMOND (INDUSTRIAL)		n.a.	(m. carats) 60[14]	DR Congo, Russia, Australia
DIATOMITE	○	●	○		○			●	○						○					○	●	●				○	DIATOMITE		SiO_2	2,000	USA, China, Denmark
DOLOMITE	○		●		●	●	●	●				●			○				●			○		●			DOLOMITE		CaO·MgO	≥2,000,000	Global
FELDSPAR	○					●													●		●	●				○	FELDSPAR		$Al_2O_3K_2O·Na_2O$	23,000	Turkey, Italy, China
FLUORSPAR					○	○	●												○	●						○	FLUORSPAR		CaF_2	6,250	China, Mexico, Mongolia
GARNET	●											●															GARNET		n.a.	1,600	India, China, Australia
GRAPHITE			○	●		○				○				○		●	●		●	○		○		●			GRAPHITE		C	700	China, Brazil, India
GYPSUM			●		●	○		●						○			○					○					GYPSUM	Anhydrite	$CaSO_4$	246,000	China, USA, Iran
ILMENITE	○					○	●		○	○					○				○	○	●	●	●		○	○	ILMENITE		TiO_2	6,600	Australia, South Africa, China
IODINE			●				●				○	●			●				○		○						IODINE	Brines; Caliche nitrate	I	32	Chile, Japan, USA
IRON OXIDE	○				●			●			○		●			○			●	○	●						IRON OXIDE	Haematite; Goethite; Magnetite; Micaceous IO; Ochre; Umber	Fe_2O_3	≥1,700[7]	India, Pakistan, Spain
KAOLIN			○		●		●	○						○				●		○	●	●	●	●			KAOLIN	Kaolinite; Halloysite	$Al_2O_3·SiO_2$	44,000[12]	USA, Germany, China
KYANITE	○					●									○		●	○			○		●			○	KYANITE		Al_2O_3	102	USA, India, Brazil
LIME*			●				●	●						○				●	●	○		○					LIME*	Limestone; Dolomite; Chalk	CaO	350,000	China, USA, India
LITHIUM				●	○	●	○							○			●	●	○		○					○	LITHIUM	Spodumene; Petalite; Lepidolite; Brines; Salt lakes; Hectorite; Zinnwaldite	Li_2O: Li_2CO_3 equiv.	(Li_2CO_3 equiv.) 170	Australia, Chile, China
MAGNESITE		○	●		●	○	●	●										○	○		○	○		○			MAGNESITE		$MgCO_3$	25,000	China, Russia, Turkey
MAGNESIA*			●		●	●	●	●	○		○	●		●	○	○	○	○	●	○	○	○	●	○	○		MAGNESIA*	Magnesite; Serpentinite; Brucite; Dolomite; Seawater; Brines	MgO	12,000	China, Russia, Turkey
MANGANESE			○	●		○	●	○				○			○			○	●	○	●						MANGANESE	Pyrolusite; Psilomelane	Mn; MnO_2	2,000	China, South Africa, Australia
MICA					●				○		○					○	○			●	●	●			●	○	MICA	Muscovite; Phlogopite	n.a.	1,130	China, Russia, USA
MULLITE**						●									●									●			MULLITE**	Alumina; Bauxite; Kaolin; Kyanite; Pyrophyllite	Al_2O_3	1,000	USA, China, Brazil
NEPHELINE SYENITE	○					●	○	○										●	○		●	●			○		NEPHELINE SYENITE		Al_2O_3; K_2O; Na_2O	5,600	Russia, Canada, Norway
NITRATES			●			○	●								○			○	○								NITRATES	Caliche ore: Nitratine	$NaNO_3$	550	Chile
OLIVINE	●		○			○		●				○			●			●		○			●				OLIVINE	Dunite; Serpentine	MgO	8,000	Norway, Japan, Spain
PERLITE	○	○	●			○	○	●							○			○		●	●		○				PERLITE		n.a.	3,800	China, Greece, Turkey
PHOSPHATE			●				●		●									○	○								PHOSPHATE	Fluorapatite	P_2O_5	220,000	China, Morocco, USA
POTASH	○		●	○			●	○		○									○								POTASH	Carnallite; Kainite; Langbeinite; Sylvite	K_2O	36,000	Canada, Russia, Belarus
PUMICE	●	○	●					●	○									○				○	○				PUMICE		n.a.	17,600	Turkey, Italy, Saudi Arabia
PYROPHYLLITE			○			○	●															○	○	●	○		PYROPHYLLITE		n.a.	1,000	South Korea, Japan, Pakistan
QUARTZ*						●					●							●	●			●		○			QUARTZ*		SiO_2	250	USA, China, Norway
RARE EARTHS	○			○		●	●				●							●	●								RARE EARTHS	Bastnaesite; Monazite; Xenotime; Ionic clays	RE oxides	(REO) 143	China, Australia, USA
RUTILE						○	○		○	○									○		●	●	●	○	○	○	RUTILE		TiO_2	800	Australia, Sierra Leone, South Africa
SALT			●				●					●			●				○	○			○		○		SALT	Halite	NaCl	269,000	China, USA, India
SEPIOLITE		●	○										○							○	○				○		SEPIOLITE		n.a.	600	Spain, Turkey, USA
SILICA SAND	●				●	●	●	●				●			●			●	○	●	●	●				○	SILICA SAND	Quartz	SiO_2	200,000	China, USA, Italy
SILICON CARBIDE**	●					●						○							●					●			SILICON CARBIDE**	Silica+Coke	SiC	1,000	China, Norway, Japan
SILLIMANITE	○					●									○									●			SILLIMANITE		Al_2O_3	62	India
SPINEL**						●				○	○							○		○				●			SPINEL**	Magnesia+Alumina	$MgO·Al_2O_3$	100,000	China, Germany, USA
SODA ASH			○				●		○	●		○			○			●	○	○	○		○				SODA ASH	Trona; Nahcolite	Na_2CO_3	14,000	USA, Turkey, China
SODA ASH**			○				●		○	●		○			○			●	○	○	○		○				SODA ASH**	Salt+Limestone+Coke	Na_2CO_3	37,000	China, Russia, Germany
SODIUM SULPHATE							○			●					○			●			○		○				SODIUM SULPHATE	Mirabilite; Thenardite	Na_2SO_4	8,000[9]	China, Spain, Mexico
SULPHUR			●				●	○							○				○		○				○		SULPHUR	Pyrites; Recovered as by-product; Native sulphur	S	60,000[10]	China, USA, Russia
TALC			○			●		●	●			○			○		○			●	●	●	○	●			TALC		n.a.	6,000	China, India, USA
VERMICULITE		●	●				●							○			○		○	○	○		○				VERMICULITE		n.a.	400	South Africa, USA, China
WOLLASTONITE			○		○	●		●									○	○			●	●			○	○	WOLLASTONITE		n.a.	1,000	China, India, USA
ZEOLITES[11]	○	●	●		○		○		●		●	●										○					ZEOLITES*		n.a.	3,000	China, South Korea, USA
ZIRCON	●					●	●							●		○	○						●		○		ZIRCON		ZrO_2	1,100	Australia, South Africa, China
ZIRCONIA*						●	●		○		●				○			○	○	○	●		○	●			ZIRCONIA*	Zircon; Baddeleyite	ZrO_2	200	China, USA, Japan

NOTES

1. main industrial minerals and rocks, and commercial terms (eg. asbestos, borates), which are traded for their non-metallurgical value; also included and indicated as shown are leading mineral products derived by processing from minerals and rocks (eg. alumina, lime), and synthetic minerals manufactured from minerals, rocks, and other materials (eg. silicon carbide, spinel)
2. major (●) and minor (○) industrial consuming markets by volume, not exhaustive, there are many other miscellaneous uses specific to certain minerals
3. if applicable, the main feedstock raw materials/pigments
4. the mineral's main chemical component specified in commercial grades, usually responsible for imparting key properties; n.a. not applicable to certain minerals/rocks which may more on physical properties
5. '000s tonnes. Estimate of annual world production known in 2015 for non-metallic ores; if production data from a range of sources including USGS, BGS, Roskill, IMFORMED estimates
6. the three leading producing countries of non-metallurgical grades, ranked in descending order of output; "Global" indicates abundant and widespread world production
7. rutile is a non-oxide pigment ore
8. high quality (>96.5% SG) & high purity (>99.99% SG) quartz
9. in addition, about 4m tpa synthetic Na_2SO_4 as by-product from rayon , borates, tittium, HCl production
10. all forms of sulphur; >90% recovered from oil/gas processing
11. natural zeolites; high value synthetic zeolites are used in agrimarkets, chemicals, detergents, environment
12. crude & processed, of which about 29m tonnes is processed
13. natural industrial diamond; synthetic diamond production is about 4,400m carats
14. (m. carats) 60[14]

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- Leading industrial minerals
- Main raw material feedstock
- Key specified chemical component
- World production
- Main source countries
- Leading consuming markets

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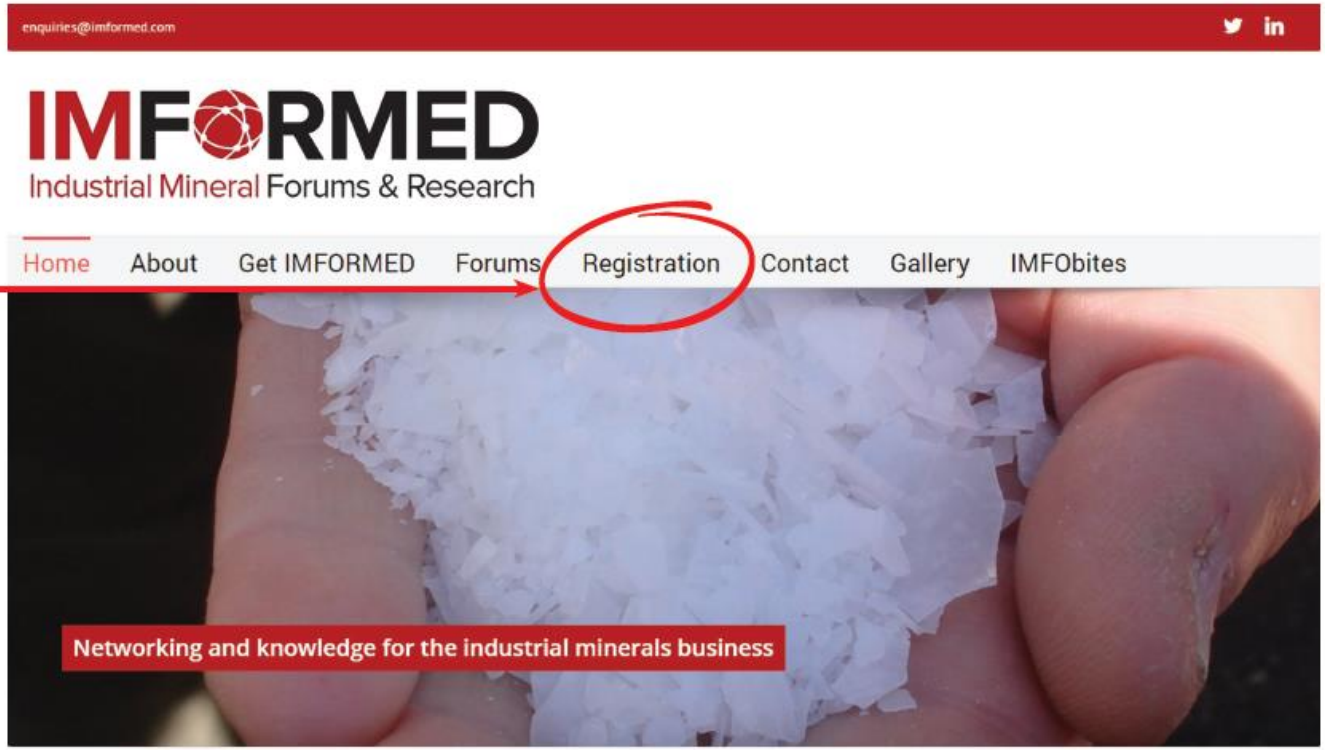

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