



AMMONIA-METHANOL CO-PRODUCTION

KBR and Johnson Matthey (JM) have partnered to combine their respective market-leading ammonia and methanol technologies to offer a new ammonia-methanol co-production process.

JM and KBR are offering licensing and a basic engineering design package, and catalyst and proprietary equipment for ammonia-methanol co-production plants with the following features and benefits:

- Significant CAPEX reduction compared to independent methanol and ammonia plants and to competitor offerings
- Integration of the process streams, resulting in lower OPEX
- Highest proven reliability and onstream factor, and intrinsically safer operation
- Well-proven technology utilizing the JM Steam Methane Reformer (SMR) and methanol synthesis process and KBR Purifier[™] technologies
- Integrated steam and boiler feedwater system to reduce CAPEX and designed in manner that upsetting of one unit has no impact on the other
- Flexibility to operate either the methanol or ammonia unit independently when other unit is not operating

The flowsheet can produce up to 6,800 metric tons per

day (MTPD) of methanol + ammonia in a single train plant without the need for an air separation unit (ASU) or pure oxygen, reducing CAPEX and increasing reliability and safety. The flowsheet offers flexibility in methanol/ ammonia production ratio and can be optimized in the design to allow a range of production capacities.

The co-production process is based on JM SMR and methanol synthesis reactor and KBR Purifier technologies, which in and by themselves offer:

World-Leading Experience

- JM has licensed over 100 grassroots methanol plants since 1960s
- KBR has licensed more than 250 grassroots ammonia plants since 1950s and 44 new grassroots with 26 based on Purifier technology since 2000

Highest Proven Reliability

(Based on 'Plant Survey International' worldwide survey)

- KBR Purifier plants have on average 13 days more online time per year than non-KBR ammonia plants
- JM methanol plants have on average 9 days more online time per year than non-JM plants

Attractive Economics

- Lowest demonstrated CAPEX
- Lowest proven OPEX



--- Optional connection which depends on the plant capacity ratio and clients requirement.



ABOUT JOHNSON MATTHEY

Johnson Matthey is a global leader in science that enables a cleaner and healthier world. With over 200 years of sustained commitment to innovation and technological breakthroughs, we improve the performance, function and safety of our customers' products. Our science has a global impact in areas such as low emission transport, pharmaceuticals, chemical processing and making the most efficient use of the planet's natural resources. Today more than 14,000 Johnson Matthey professionals collaborate with our network of customers and partners to make a real difference to the world around us. For more information, visit www.matthey.com

Inspiring science, enhancing life

ABOUT KBR

We deliver science, technology and engineering solutions to governments and companies around the world. KBR employs approximately 28,000 people performing diverse, complex and mission-critical roles in 34 countries.

KBR is proud to work with its customers across the globe to provide technology, value-added services, and long-term operations and maintenance services to ensure consistent delivery with predictable results. At KBR, We Deliver.

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