



....Making Carbon Green

Microcatalytic Coal Liquefaction Flexible Product Slate



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MCL Can Produce A Flexible Product Slate

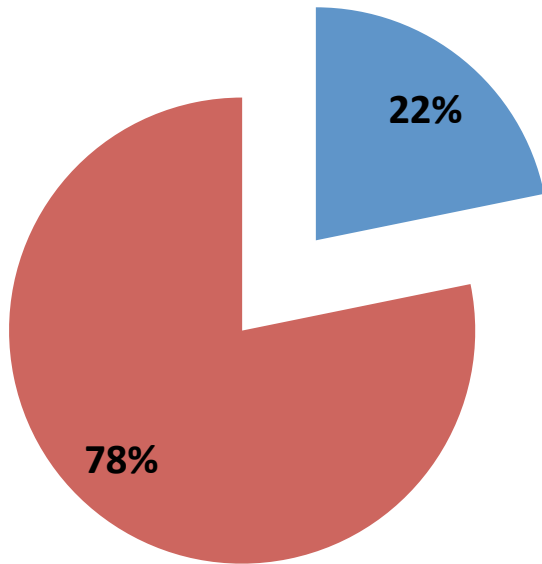
- **Product slate can be varied from Max Gasoline all the way to a SYNCRUDE**
- **Altering product slate only requires adjustment of MCL and Upgrading operating conditions**
 - Small pre-investment required to provide wide range of slates for a commercial plant
- **MCL naphtha can be converted into an on-spec gasoline or catalytically reformed to a 105+ Octane blend stock**
- **MCL diesel and jet fuel have high volumetric energy content and excellent cold flow properties**
 - Properties result in added MPG
 - Diesel can be used in Arctic conditions



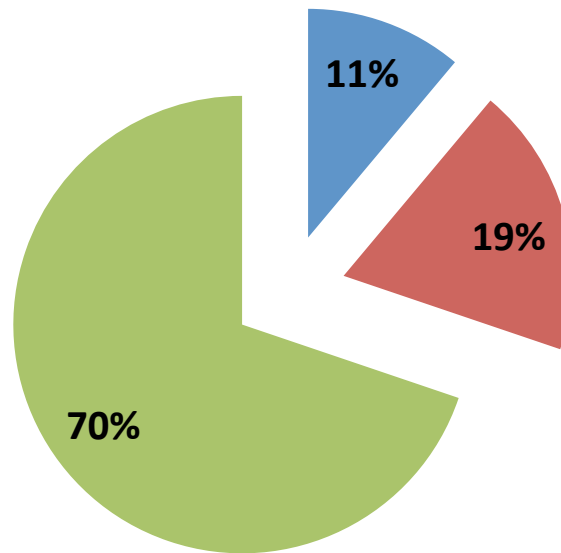
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MCL Flexible Product Slate

Max Gasoline



Max Diesel



- LPG
- Gasoline
- Diesel

Product Yields in wt%



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MCL Syncrude Interesting For U.S. Gulf Coast Refineries and Chemical Plants

- **Syncrude boiling range C3/1000°F**
 - Does not contain difficult to convert 1,000°F+ vacuum resid
 - Eliminates need for major refinery investment to shift from high gasoline to higher diesel product slate
- **350/1000°F fraction excellent refinery feedstock**
 - Readily converted into high yield of jet fuel and diesel
 - Diesel meets U.S. low sulfur fuel specifications
 - Helps offset low diesel yield from fracking crudes
- **350°F Minus cut excellent for Chemical Plant feed**
 - Catalytic reforming of 160/350° readily converted into 90%+ aromatics
 - Aromatics rich stream allows debottlenecking of existing extractions units
 - Paraffinic raffinate from extraction and C3/C4 excellent feed to steam cracker for olefin production