

# Photometer applications in the butyl rubber process

## PIR3502 Multiwave process photometer



Produce fast, reliable results and allow for better, feed-forward process control.

**Measurement made easy**

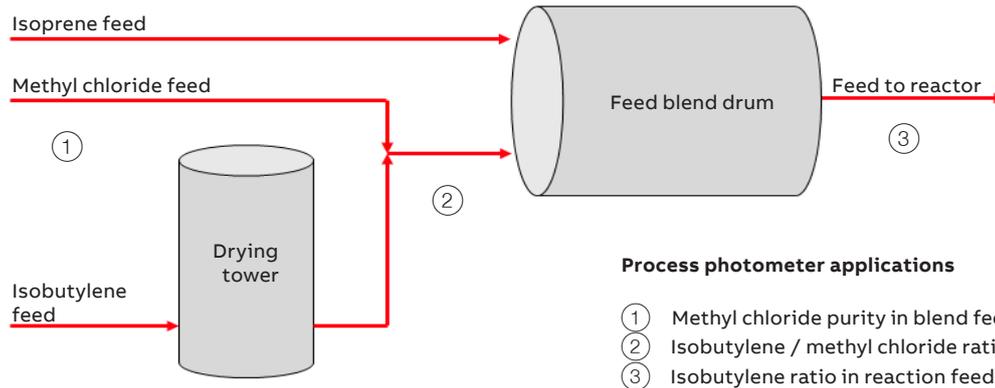
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PIR3502 IR  
process photometer

**Industry**  
Petrochemical

**Introduction**  
Butyl rubber is a synthetic rubber that is used in a large number of commercial products, including tire inner tubes, adhesives, lubricants, and chewing gum. It is produced by the polymerization of isobutylene with a small amount of isoprene, using methyl chloride as a reaction diluent. The ABB PIR3502 can continuously measure key components in this process, producing fast, reliable results and allowing for better, feed-forward process control.

**The analyzer**  
The ABB Multiwave process photometer is a fixed filter, multiple wavelength analyzer that has a capacity for up to eight optical filters, which enables the analyzer to measure multiple components. The analyzer ratios the energy from the analytical wavelength filters to the reference wavelength filters. Analyzers used in the butyl rubber process utilize optical filters in the Infrared (IR) region of the electromagnetic spectrum. These analyzers are reliable, durable, and can be used to optimize the butyl rubber process.

## Isoprene feed composition measurements



### Discussion

Isobutylene and Isoprene are fed to a feed blend drum to produce butyl rubber. The Isobutylene is held in excess, in order to ensure that all of the more expensive isoprene is used up in the resulting reaction. Methyl chloride is also added, as a reaction diluent. The blended stream is then chilled and fed to a reactor, resulting in a slurry of butyl rubber particles dispersed in methyl chloride. After the rubber particles are separated, the remaining Isobutylene and methyl chloride are separated, dried, and recycled back to the beginning of the process. A simplified schematic of this process is shown above. The reaction efficiency and feed-forward process control can be monitored with the following measurements using the ABB process photometer:

1. Methyl chloride purity in blend feed measurement with a PIR3502:
  - 0 to 100 % methyl chloride
2. Isobutylene / methyl chloride ratio in blend feed measurement with a PIR3502:
  - 0 to 15 % isobutylene
3. Isobutylene / isoprene ratio in reactor feed measurements with a PIR3502:
  - 0 to 100 % methyl chloride
  - 0 to 30 % isobutylene
  - 0 to 3 % isoprene
  - 0 to 20 % water vapor

### Conclusion

The use of the ABB process photometer can greatly aid in the production of butyl rubber. The continuous measurement of both the purity of the methyl chloride and Isobutylene feeds to the mixing drum allowing quick reaction to any process upsets. The monitoring of the Isobutylene/Isoprene ratio in the reactor feed ensures product quality. Methyl chloride and water vapor are also measured in the reactor feed. This four component application can be made on a single analyzer, which makes the PIR3502 a very economical choice to help maximize reactor efficiency.