PRESSURE INFLUENCE ON OXIDATIVE CRACKING OF LIGHT ALKANES

A. S. Dmitruk[1,2], A. V. Nikitin[1,3], L. N. Strekova[1], and V. S. Arutyunov[1,2,3]

[1]N. N. Semenov Institute of Chemical Physics, Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation
[2]Faculty of Fundamental Physical and Chemical Engineering, M. V. Lomonosov Moscow State University, Leninskie Gory, Moscow 119991, Russian Federation
[3]Institute of Problems of Chemical Physics, Russian Academy of Sciences, 1 Acad. Semenov Av., Chernogolovka, Moscow Region 142432, Russian Federation

Abstract: The increased pressure reduces the temperature of oxidative cracking of light alkanes but with increasing pressure, this effect is reduced. High pressure decreases the temperature to reach complete conversion of oxygen; however, it virtually does not change the maximum achievable conversion of alkanes.

Keywords: natural gas; associated gas; alkanes; oxidative cracking; pressure

Acknowledgments

The work was performed in the frame of the Program of the Department of Chemistry and Material Sciences of the Russian Academy of Sciences No. 7.

References

1. Arutyunov, V. S., R. N. Magomedov, A. N. Rakhmetov, A. Yu. Proshina, and G. G. Politenkova. 2012. Selektivnyy oksikreking tyazhelykh komponentov poputnogo gaza [Selective oxycracking of heavy ingredients of associated petroleum gas]. *Goren. Vzryv (Mosk.) — Combustion and Explosion* 5:116–119.
2. Shtern, V. Ya. 1964. *Gas phase oxidation of hydrocarbons.* Oxford – London – New-York: Pergamon Press. 724 p.
3. Magomedov, R. N., A. Yu. Proshina, and V. S. Arutyunov. 2013. Gas-phase oxidative cracking of ethane in a nitrogen atmosphere. *Kinet. Catal.* 54(4):383–393.
4. Sheverdinkin, E. V., V. S. Arutyunov, V. M. Rudakov, and V. I. Savchenko. 2004. Kinetics of partial oxidation of alkanes at high pressures: Oxidation of ethane and methane–ethane mixtures. *Theor. Found. Chem. Eng.* 38:311–315.
5. Magomedov, R. N., A. V. Nikitin, V. I. Savchenko, and V. S. Arutyunov. 2014. Production of gas mixtures with regulated ratios between ethylene and carbon monoxide by the gas-phase oxidative cracking of light alkanes. *Kinet. Catal.* 55(5):556–565.

Received December 18, 2015

Contributors

Dmitruk Anna S. (b. 1992) — graduate student, M. V. Lomonosov Moscow State University, Leninskie Gory, Moscow 119991, Russian Federation; research scientist, N. N. Semenov Institute of Chemical Physics, Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation; anitadmitruk@gmail.com

Nikitin Aleksey V. (b. 1988) — research scientist, N. N. Semenov Institute of Chemical Physics, Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation; engineer, Institute of Problems of Chemical Physics, Russian Academy of Sciences, 1 Acad. Semenov Av., Chernogolovka, Moscow Region 142432, Russian Federation; ni_kit_in@rambler.ru

Strekova Ludmila N. (b. 1954) — Candidate of Science in chemistry, associate professor, leading research scientist, N. N. Semenov Institute of Chemical Physics, Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation; strekova@bk.ru

Arutyunov Vladimir S. (b. 1946) — Doctor of Science in chemistry, professor, head of laboratory, N. N. Semenov Institute of Chemical Physics, Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation; Institute of Problems of Chemical Physics, Russian Academy of Sciences, 1 Acad. Semenov Av., Chernogolovka, Moscow Region 142432, Russian Federation; arutyunov@chph.ras.ru