

6. Referências Bibliográficas

1. Almeida, E. L. F. et al., **O Renascimento de uma Tecnologia Madura: O Processo Fischer-Tropsch de Conversão de Gás em Combustíveis Líquidos**. XXII Simpósio de Gestão da Inovação Tecnológica, 2002.
2. BP Statistical Review of World Energy. Disponível em: www.bp.com/worldenergy. Acesso em 11/2009.
3. Almeida, E., **Increase in Environmental Restrictions as a Leverage to GTL Projects**, Institute of Economics UFRJ – 2003. Acesso: http://www.gee.ie.ufrj.br/publicações/pdf/2003_increase_environmental.pdf.
4. Portal do Gás Natural. Disponível em www.portal.gasnatural.com.br; Data do último acesso 11/2009.
5. Wilhelm, D.J. et al., **Syngas Production for Gas to Liquids Applications, Technologies, Issues and a Outlook**. Fuel Proc. Tech. 71, 2001.
6. Vosloo, A.C., **Fischer-Tropsch; a Futuristic View**, Fuel Processing Technology, 71 (2001) 149-155.
7. Fleisch, T.H.; Sills, S.A.; Briscoe, M.D., **Emergence of the Gas to Liquids Industry: a Review of Global GTL Developments**, J. Nat. Gas Chem. 11 (2002) 1-14.
8. Ferreira, R.L.P.; Bontempo, J.V.; Almeida, E.L.F., **Estudo das Inovações Tecnológicas em GTL com Base em Patentes: o Caso Shell**. 2º Congresso Brasileiro de P & D em Petróleo e Gás, Rio de Janeiro, 2003.
9. Diário do Comércio Indústria e Serviços/CTGás; **Petrobrás Converterá Gás Natural em Produtos Líquidos (GTL)**. Disponível em www.gasnet.com.br, Outubro 2006.
10. Aguiar, E.F.S.; Appel, L.G.; Mota, C., **Natural Gas Chemical Transformations: the Path to Refining in the Future**, Catal. Today 101 (2005) 3-7.

11. Corke, M.J., **GTL Technologie Focus on Lowering Costs**. Oil and Gas Journal v.96, nº 38, p.71, September, 1998.
12. Gas to Liquids Technology Worldwide; **New Technology is Being Developed and Applied to Convert Natural Gas to Liquids in Gas to Liquids Technology (GTL)**. Disponível em www.chemlink.com.au/gtl.htm, acesso em Novembro 2009.
13. P.H., Groggins **Unit Processes in Organic Synthesis**. McGraw-Hill Book Company, fifth edition.
14. Storch, H.H; Goulombic, N.; Anderson, B.R., **The Fischer-Tropsch and Related Syntheses**, Wiley: New York, 1951.
15. Davis, B.H., **Fischer-Tropsch Synthesis: Current Mechanism and Futuristic Needs**, Fuel Processing Tech. 71 (2001) 157-166.
16. Brady, R.C.; Pettit, R., **On the Mechanism of the Fischer-Tropsch Reaction. The Chain Propagation Step**, J. Am. Chem. Soc. 103 (1981) 1287-1289.
17. Kummer, J.T.; Emmett, P.H., **Fischer-Tropsch Synthesis Mechanism Studies. The addition of Radioactive Alcohols to the Synthesis Gas**, J. Am. Chem. Soc. 75 (1953) 5177-5183.
18. Hall, W.K.; Kokes, R.J.; Emmett, P.H., **Mechanism Studies of the Fischer-Tropsch Synthesis: The Incorporation of Radioactive Ethylene, Propionaldehyde and Propanol**, J. Am. Chem. Soc. 82 (1960) 1027.
19. Dijk, H.A.J. Van., **The Fischer-Tropsch Synthesis: A Mechanistic Study Using Transient Isotopic Tracing**. Library Technische Universiteit Eindhoven, Paises Baixos, 2001.
20. Dry, M.E., **Practical and Theoretical Aspects of the Catalytic Fischer-Tropsch Process**. Appl. Catal. A. 138 (1996) 319-344.
21. Bartholomew, C.H., **History of Cobalt Catalyst Design for FTS** - National Spring Meeting of the American Institute of Chemical Engineers, New Orleans, 2003.
22. Vannice M. A., **The Catalytic Synthesis of Hydrocarbons from H₂/CO Mixtures over the Group VIII Metals**, J. Catal. 37 (1975) 449-461

23. Bartholomew, C. H.; Reuel, R. C., **Effects of Support and Dispersion on the CO Hydrogenation, Activity/Selectivity Properties of Cobalt**, J. Catal. 85 (1984) 78.
24. Iglesia, E.; Soled, S. L.; Fiato, R. A., **Fischer-Tropsch Synthesis on Cobalt and Ruthenium. Metal Dispersion and Support Effects on Reaction Rate and Selectivity**, J. Catal. 137 (1992) 212-224.
25. Goodwin, J. G.; Kogelbauer A.; Oukau R., **Ruthenium Promotion of Co/Al₂O₃ Fischer-Tropsch Catalysts**, J. Catal. 166 (1997) 8-15.
26. Holmen, A. et al., **Study of Pt-Promoted cobalt CO Hydrogenation Catalysts**, J. Catal. 156 (1995) 85-95.
27. Ernst, B. et al., **Preparation and Characterization of Fischer-Tropsch Active Co/SiO₂ Catalysts**, Appl. Catal. A: Gen. 186 (1999) 145-168.
28. Iglesia, E., **Design, Synthesis, and Use of Cobalt based Fischer-Tropsch Synthesis Catalysts**, Appl. Catal. A: Gen. 161 (1997) 59-78.
29. Song, D.; Li, J., **Effect of Catalyst Pore Size on the Catalytic Performance of Silica Supported Cobalt Fischer-Tropsch Catalysts**, J. Mol. Catal. A: Chem. 247 (2006), 206-212.
30. Iwasaki, T. et al., **Use of Silicate Crystallite Mesoporous Material as Catalyst Support for Fischer-Tropsch Reaction**. Appl. Surf. Scienc. 130-132 (1998) 845-850.
31. Kraum, M.; Baerns, M., **Fischer-Tropsch Synthesis. The Influence of Various Cobalt Compounds Applied in the Preparation of Supported Cobalt Catalysts on their Performance**. Appl. Catal. A: Gen. 186 (1999) 189-200.
32. Niemantsverdriet, J.W.; Vander Kraan, A.M., **On the Time-Dependent Behavior of Iron Catalysts in Fischer-Tropsch Synthesis**, J. Catal. 72 (1981) 385-388.
33. Raupp, G.B.; Delgass, W.N., **Mossbauer Investigation of Supported Fe and FeNi Catalysts: II Carbides formed Fischer-Tropsch Synthesis**, J. Catal. 58 (1979) 348-360.

34. Amelse, J.A.; Butt, J.B.; Schwartz, L.H., **Carburization of Supported Iron Synthesis Catalysts**, J. Phys. Chem. 82 (1978) 558-563.
35. Reymold, J. P.; Mériaudeau, P.; Teichner, S.J., **Changes in the Surface Structure and Composition of an Iron Catalyst of Reduced or Unreduced Fe₂O₃ During the Reaction of Carbon Monoxide and Hydrogen**, J. Catal. 75 (1982) 39-48.
36. Soled, S.L. et al., **Selective Synthesis of Olefins on Fe-Zn Fischer-Tropsch Catalysts**. Topics in Catal. 2 (1995) 193.
37. Davis, B.H., **Fischer-Tropsch Synthesis: Relationship between Iron Catalyst Composition and Process Variables**, Catal. Today. 84 (2003) 83-98.
38. Bukur, D.B. et al., **Binder/Support Effects on the Activity and Selectivity of Iron Catalysts in the Fischer-Tropsch Synthesis**, Ind. Eng. Chem. Res. 29 (1990) 1588-1599.
39. Bukur, D.B.; Sivaraj, C., **Supported Iron Catalysts for Slurry Phase Fischer Tropsch Synthesis**, Appl. Catal. A: Gen. 231 (2002) 201-214.
40. Jin, Y.; Datye, A.K., **Phase Transformations in Iron Fischer-Tropsch Catalysts during Temperature Programmed Reduction**, J. Catal. 196 (2008) 8-17.
41. O'Brien, R.J. et al., **Activity, Selectivity and Attrition Characteristics of Supported Iron Fischer-Tropsch Catalysts**, Appl. Catal. 196 (2000) 173-178.
42. Lázár, K. et al., **Spectroscopic and Catalytic Study on Metal Carbonyl Clusters Supported on Cab-O-Sil: III. Application of Low-Temperature, High-field Mössbauer Spectroscopy and Ferromagnetic Resonance for Characterizing FeRu Bimetallic Catalysts**, J. Catal. 100 (1986) 118-129.
43. Ott, G.L.; Fleisch, T.; Delgass, W.N., **Fischer-Tropsch Synthesis over Freshly Reduced Iron-Ruthenium Alloys**, J. Catal 60 (1979) 394-403.

44. Bahome, M.C. et al., **Fe-Ru Small Particle Bimetallic Catalysts Supported on Carbon Nanotubes for Use in Fischer-Tropsch Synthesis**, Appl. Catal. A: Gen. 328 (2007) 243-251.
45. Ma, W. et al., **Mo-Fe Catalysts Supported on Activated Carbon for Synthesis of Liquid Fuels by the Fischer-Tropsch Process: Effect of Mo Addition on Reducibility, Activity, and Hydrocarbon Selectivity**, Energy & Fuels 20 (2006) 2299-2307.
46. O'Shea, V.A. de La Peña et al., **Unusually High Selectivity to C₂₊ Alcohols on Bimetallic CoFe Catalysts during CO Hydrogenation**, Catal. Lett. 88 (2003) 123-128.
47. Duvenhage, D.J.; Coville, N.J., **Fe:Co/TiO₂ Bimetallic Catalysts for the Fischer-Tropsch Reaction; Part 3: The Effect of Fe:Co Ratio, Mixing and Loading on FT Product Selectivity**, Appl. Catal. 289 (2005) 231-239.
48. Samuel, P., **GTL Technology-Challenges and Opportunities in Catalysis**- Bulletin of the Catalysis Society of India 2 (2003) 82-99.
49. Fischer-Tropsch Reactor fed by Syngas. Disponível em: www.zero.no/transport/bio/fischer-tropsch-reactor-fed-by-syngas. Acesso em 11/2009.
50. Mascarenhas, A.J.S.; Oliveira, E.C.; Pastore, H.C., **Peneiras Moleculares: Selecionando as moléculas por seu tamanho** – Maio 2001.
51. Khodakov, A.Y.; Bechara, R.; Griboval-Constant, A., **Fischer-Tropsch Synthesis over Silica Supported Cobalt Catalysts: Mesoporous Structure versus Cobalt Surface Density**, Appl. Catal. 254 (2003) 273-288.
52. Beck, J.S. et al., **A New Family of Mesoporous Molecular Sieves Prepared with a Liquid-Crystal Template**, J. Am. Chem. Soc. 114 (1992) 10834-10.843.
53. Kresge, C.T.; et al., **Ordered Mesoporous Molecular Sieves Synthesized by a Liquid-Crystal Template Mechanism**, Nature 359 (1992) 710-712.

54. Panpranot, J. et al., **Effect of Cobalt Precursors on the Dispersion of Cobalto on MCM-41**, *Cat. Lett.* 91 (2003) 95-102.
55. Panpranot, J.; Goodwin, J.G.; Sayari. A., **CO Hydrogenation on Ru-Promoted Co/MCM-41 Catalysts**, *J. Catal.* 211 (2002) 530-539.
56. Szegadi, A. et al., **Spherical Mesoporous MCM-41 Materials Containing Transition Metal: Synthesis and Characterization**, *Appl. Catal. A: Gen.* 272 (2004) 257-266.
57. Grun, M.; Lauer, I.; Unger, K.K., **Homogeneous Precipitation of Siliceous MCM-41**, *Adv. Mater.* 9 (1997) 254-257.
58. Park, S.E.; et al., **Photoluminescence Spectroscopic Monitoring in the Synthesis of Mesoporous Materials by Microwave Induced Heating**. In *Mesoporous Molecular Sieves* 117 (1998) 265.
59. Li, H.; et al., **Studies on MCM-48 Supported Cobalt Catalyst for Fischer-Tropsch Synthesis**. *J. Mol. Catal.* 224 (2006) 33-40.
60. Zhao, D.; et al., **Triblock Copolymer Synthesis of Mesoporous Silica with Periodic 50 to 300 Angstrom Pores**, *Science* 279 (1998) 548-552.
61. Zhao, D.; et al., **Nonionic Triblock and Star Diblock Copolymer and Oligomeric Surfactant Synthesis of Highly Ordered, Hydrothermally Stable, Mesoporous Silica Structures**, *J. Am. Chem. Soc.* 120 (1998) 6024-6036.
62. Cao, L.; et al., **Synthesis of Large Pore SBA-15 Silica using Poly (Ethylene Oxide) – Poly (Methyl Acrylate) Diblock Copolymers**, *Adsorption* 15 (2009) 156-166.
63. Feng, P.; Bu, X.; Pine, D.J., **Control of Pore Sizes in Mesoporous Silica Templated by Liquid Crystals in Block Copolymer-Cosurfactant-Water Systems**, *Langmuir* 16 (2000) 5304-5310.
64. Zhao, D.; et al., **Morphological Control of Highly Ordered Mesoporous Silica SBA-15**, *Chem. Mater.* 12 (2000) 275-279.
65. Luan, Z.; et al., **Alumination and Ion Exchange of Mesoporous SBA-15 Molecular Sieves**, *Chem. Mater.* 11 (1999) 1621-1627.

66. Khodakov, A.Y.; et al., **Pore Size Effects in Fischer-Tropsch Synthesis over Cobalt-Supported Mesoporous Silicas**, J. Catal. 206 (2002) 230-241.
67. Khodakov, A.Y.; et al., **Pore Size Control of Cobalt Dispersion and Reducibility in Mesoporous Silicas**, J. Phys. Chem. B. 105 (2001) 9805-9811.
68. Khodakov, A.Y.; et al., **Impact of Aqueous Impregnation on the Long-Range Ordering and Mesoporous Structure of Cobalt Containing MCM-41 and SBA-15 Materials**, Microp. Mesop. Mater. 79 (2005) 29-39.
69. Wang, Y.; et al., **Synthesis of SBA-15 with Different Pore Sizes and the Utilization as Supports of High Loading of Cobalt Catalysts**, Catal. Today 68 (2001) 3-9.
70. Martinez, A.; et al., **Fischer-Tropsch Synthesis of Hydrocarbons over Mesoporous Co/SBA-15 Catalysts: The Influence of Metal Loading, Cobalt Precursor and Promoters**, J. Catal. 220 (2003) 486-499.
71. Cai, Q.; Li, J., **Catalytic Properties of the Ru Promoted Co/SBA-15 Catalysts for Fischer-Tropsch Synthesis**, Catal. Commun. 9 (2008) 2003-2006.
72. Xiong, H.; et al., **Fischer-Tropsch Synthesis: The role of pore size for Co/SBA-15 catalysts**, J. Mol. Catal.A: Chem. 295 (2008) 68-76.
73. Hong, J., et al., **Effect of promotion with Ruthenium on the Structure and Catalytic Performance of Mesoporous Silica (Smaller and Larger Pore) Supported Cobalt Fischer-Tropsch Catalysts**, Catal. Today 140 (2009) 135-141.
74. Ohtsuka, Y.; et al., **Novel Utilization of Mesoporous Molecular Sieves as Supports of Cobalt Catalysts in Fischer-Tropsch Synthesis**, Catal. Today 89 (2004) 419-429.
75. Kim, D. J.; et al., **SBA-15 Supported Iron Catalysts for Fischer-Tropsch Production of Diesel Fuel**, Energy & Fuels, 20 (2006) 2608-2611.

76. Tanev, P.T.; Chibwe, M.; Pinnavaia, T.J., **Titanium-Containing Mesoporous Molecular Sieves for Catalytic Oxidation of Aromatic Compounds**, *Nature* 368 (1994) 321-322.
77. Tanev, P.T.; Pinnavaia, T.J., **A Neutral Templating Route to Mesoporous Molecular Sieves**, *Science*, 267 (1995) 865-867.
78. Yin, D.; et al, **Mesoporous HMS Molecular Sieves Supported Cobalt Catalysts for Fischer-Tropsch Synthesis**, *Microp. and Mesop. Mater.* 47 (2001) 15-24.
79. Yang, W.S.; et al, **Characteristics and Reactivities of Cobalt based Mesoporous Silica Catalysts for Fischer-Tropsch Synthesis**, *Stud. Surf. Scienc. Catal.* 146 (2003) 693-696.
80. Lira, E.; et al., **HMS Mesoporous Silica as Cobalt Support for the Fischer-Tropsch Synthesis: Pretreatment, Cobalt Loading and Particle Size Effects**. *J. Mol. Catal. A: Chem.* 281 (2008) 146-153.
81. Barrett, E.P.; Joyner, L.G.; Halenda, P.P., **The Determination of Pore Volume and Area Distributions in Porous Substances. I. Computations from Nitrogen Isotherms**, *J. Am. Chem. Soc.* 73 (1951) 373-380.
82. Cheng, X.; et al., **Fast Fabrication of Hollow Silica Spheres with Thermally Stable Nanoporous Shells**, *Microp. and Mesop. Mater.* 98 (2007) 41-46.
83. Zepeda, T.A.; et al., **Effect of Al and Ti Content in HMS Material on the Catalytic Activity of NiMo and CoMo Hydrotreating Catalysts in the HDS of DBT**, *Microp. and Mesop. Mater.* 111 (2008) 157-170.
84. Zhang, W.; Pauly, T.R.; Pinnavaia, T.J., **Tailoring the Framework and Textural Mesopores of HMS Molecular Sieves Through and Electrically Neutral (S^{0I}) Assembly Pathway**, *Chem. Mater.* 9 (1997) 2491-2498.
85. Castner, D.G.; Watson, P.R.; Chan, I.Y., **X-ray Absorption Spectroscopy, X-ray Photoelectron Spectroscopy, and Analytical Electron Microscopy Studies of Cobalt Catalysts**. 1.

- Characterization of Calcined Catalysts, *J. Phys. Chem.* 93 (1989) 3188-3194.
86. Schanke, D.; et al., **Study of Pt-Promoted Cobalt CO Hydrogenation Catalysts**, *J. Catal.* 156 (1995) 85-95.
87. Sun, S.; Tsubaki, N.; Fujimoto, K., **The Reaction Performances and Characterization of Fischer-Tropsch Synthesis Co/SiO₂ Catalysts Prepared from Mixed Cobalt Salts**, *Appl. Catal. A: Gen.* 202 (2000) 121-131.
88. Bartholomew, C.H., **Recent Developments in Fischer-Tropsch Catalysis**, In: Guzzi, L. (Editor), *New Trends in CO Activation*, Amsterdam: Elsevier, 1991.
89. Borg, Ø; et al., **Fischer-Tropsch Synthesis Over γ -Alumina – Supported Cobalt Catalysts**, *J. Catal.* 248 (2007) 89-100.
90. Arnoldy, P.; Moulijn, J.A., **Temperature-Programmed Reduction of CoO/Al₂O₃ Catalysts**, *J. Catal.* 93 (1985) 38-54.
91. Viswanathan, B.; Gopalakrishnan, R. **Effect of Support and Promotor in Fischer-Tropsch Cobalt Catalysts**, *J. Catal.* 99 (1986) 342-348.
92. Jacobs, G.; et al., **Fischer-Tropsch Synthesis: Support, Loading and Promoters Effects in the Reducibility of Cobalt Catalysts**, *Appl. Catal. A: Gen.* 233 (2002) 263-281.
93. Jin, Y.; Datye, A.K., **Phase Transformations in Iron Fischer-Tropsch Catalysts during Temperature-Programmed Reduction**, *J. Catal.* 196 (2000) 8-17.
94. Kock, A.J.; Fortuin, H.M.; Geus, J.W., **The Reduction Behavior of Supported Iron Catalysts in Hydrogen on Carbon Monoxide Atmospheres**, *J. Catal.* 96 (1985) 261-275.
95. Gervastini, A.; et al., **Nanodispersed Fe Oxide Supported Catalysts with Tuned Properties**, *J. Phys. Chem.C.* 112 (2008) 4635-4642.
96. Mansker, L.D.; et al., **Characterization of Slurry Phase Iron Catalysts for Fischer-Tropsch Synthesis**, *Appl. Catal.* 186 (1999) 277-296.

97. Herranz, T.; et al., **Carbon Oxide Hydrogenation over Silica-Supported Iron based Catalysts: Influence of the Preparation Route**, *Appl. Catal. A: Gen.* 308 (2006) 19-30.
98. Lei, Z.; et al., **Fe₂O₃/SBA-15 Catalyst Synthesized by Chemical Vapor Infiltration for Friedel-Crafts Alkylation Reaction**, *Microp. Mesop. Mater.* 123 (2009) 306-313.
99. Duvenhage, D.J.; Coville, N.J., **Fe:Co/TiO₂ Bimetallic Catalysts for the Fischer –Tropsch Reaction I. Characterization and Reactor Studies**, *Appl. Catal. A: Gen.* 153 (1997) 43-67.
100. Reuel, R.C.; Bartholomew, C.H., **The Stoichiometries of H₂ and CO Adsorptions on Cobalt: Effects of Support and Preparation**, *J. Catal.* 85 (1984) 63-77.
101. Morales, F.; et al., **Effects of Manganese Oxide Promoter on the CO and H₂ Adsorption Properties of Titania-Supported Cobalt Fischer-Tropsch Catalysts**, *J. Catal.* 246 (2007) 91-99.
102. Martínez, A.; Prieto, G.; Rollán, J., **Nanofibrous γ -Al₂O₃ as Support for Co-based Fischer-Tropsch Catalysts: Pondering the Relevance of Diffusional and Dispersion Effects on Catalytic Performance**, *J. Catal.* 263 (2009) 292-305.
103. Jablónski, J.M.; et al., **High Temperature Reduction with Hydrogen, Phase Composition, and Activity of Cobalt/Silica Catalysts**, *J. Catal.* 220(2003) 146-160.
104. Saib, A.M.; Claeys, M.; van Steen, E., **Silica Supported Cobalt Fischer-Tropsch Catalysts: Effect of Pore Diameter of Support**, *Catal. Today* 71 (2002) 395-402.
105. M.S. Mc Intyre, D.G. Zetaruk, **X-ray Photoelectron Spectroscopic Studies of Iron Oxides**, *Analytical Chemistry*, vol. 49, nº 11, (1977), 1521-1529.
106. Okabe, K.; et al, **Fischer-Tropsch Synthesis over Co-SiO₂ Catalysts Prepared by the Sol-Gel Method**, *Catal. Today* 89 (2004) 431-438.
107. Iglesia, E.; et al, **Synthesis and Catalytic Properties of Eggshell Cobalt Catalysts for the Fischer-Tropsch Synthesis**, *J. Catal.* 153 (1995) 108-122.

108. Lohitharn, N.; Goodwin Jr, J.G.; Lotero, E., **Fe- Based Fischer-Tropsch Synthesis Catalysts Containing Carbide- Forming Transition Metal Promoters**, J. Catal. 255 (2008) 104-113.
109. Lesaint, C.; et al., **Synthesis and Characterization of Mesoporous Alumina with Large Pore Size and Their Performance in Fischer-Tropsch Synthesis**, Appl. Catal. A: Gen. 351 (2008) 131-135.
110. Lögberg, S.; et al., **Hydrocarbon Production via Fischer-Tropsch Synthesis from H₂-Poor Syngas over Different Fe-Co/ γ -Al₂O₃ Bimetallic Catalysts**, Appl. Catal. B: Environ. 89 (2009) 167-182.