Page.

TABLE 49. Benzene and toluene formed from cracking Oklahoma crude oil in a single-tube furnace at a constant pressure of 250 pounds per square inch and a constant rate of oil feed of 22 gallons per hour, with varying temperatures 146
50. Benzene and toluene formed from cracking a distillate oil in a single-tube furnace at varying pressures, temperatures, and rates of oil feed 147
51. Benzene and toluene formed from cracking another distillate oil in a single-tube furnace at varying pressures, temperatures, and rates of oil feed 148
52. Benzene and toluene formed from cracking a fuel oil in a single-tube furnace at varying pressures, temperatures, and rates of oil feed 149
53. Benzene and toluene formed from cracking a distillate oil in a single-tube furnace at a constant pressure of 250 pounds per square inch, with varying temperatures and rates of oil feed 150
54. Benzene and toluene formed from cracking Oklahoma crude oil in a single-tube furnace at a constant pressure of 250 pounds per square inch, with varying temperatures and rates of oil feed 151
55. Relative rates of oil feed in tubes of varying diameters and lengths at a constant temperature and pressure 153
56. Variations in specific gravity of oils recovered from individual tubes in a 10-tube furnace 156
57. Benzene and toluene formed from cracking Oklahoma crude oil in 10-tube furnaces at varying pressures and rates of oil feed 160
58. Variations in specific gravity of oils recovered from individual tubes in a 10-tube furnace 162
59. Variations in percentage of benzene formed in individual tubes in a 10-tube furnace, calculated on basis of original oil 163
60. Variations in percentage of toluene formed in individual tubes in a 10-tube furnace, calculated on basis of original oil 163
61. Variations in total percentage of benzene and toluene formed in individual tubes in a 10-tube furnace, calculated on basis of original oil 164
62. Benzene and toluene formed from cracking a distillate oil in 10-tube furnaces at a constant pressure of 150 pounds per square inch 165
63. Benzene and toluene formed from cracking solvent naphtha in a single-tube furnace at varying pressures, temperatures, and rates of oil feed 185
64. Benzene and toluene formed in a single-tube furnace from cracking the residue above 175° C. of an oil previously cracked at varying pressures and rates of oil feed 186
65. Analyses of five samples of gases from 10-tube furnaces 193
66. Gasoline formed from cracking a distillate oil in a single-tube furnace at a constant pressure of 250 pounds per square inch, with varying temperatures and rates of oil feed 199
67. Gasoline formed from cracking a distillate oil in an 8-inch by 10-foot single-tube furnace, at varying temperatures, pressures, and rates of oil feed 200
68. Gasoline formed from cracking a distillate oil in a 6-inch by 9-foot single-tube furnace at varying pressures, temperatures, and rates of oil feed 201

Page.

TABLE 69. Gasoline formed from cracking a distillate fuel oil in a single-tube furnace at a constant pressure of 250 pounds per square inch, with varying temperatures and rates of oil feed 202
70. Conversion table—Baumé degrees to specific gravities 208
71. Conversion table, centigrade to Fahrenheit degrees 209
72. Physical properties of various oil and tar constituents 209
73. Properties of paraffins from Pennsylvania petroleum 210
74. Properties of hydrocarbons in Pennsylvania petroleum 210
75. Properties of hydrocarbons in Ohio petroleum 210
76. Properties of hydrocarbons in Canadian petroleum 211
77. Properties of hydrocarbons in California petroleum 211
78. Properties of naphthenes from petroleum 211
79. Properties of $C_nH_{2n}+2$ hydrocarbons 212
80. Properties of certain monocyclic polymethylenes and hydrocarbons. 212
81. Solid hydrocarbons in Pennsylvania petroleum and their physical properties 213
82. Hydrocarbons in commercial paraffins, and their physical properties. 213
83. Relation of specific gravity to melting point of paraffins 213

ILLUSTRATIONS.

Page.

PLATE I. *A*, General view of plant at Pittsburgh, Pa., where benzene-toluene process was developed; *B*, View of ground floor of furnace building, showing arrangement and appearance of completed furnaces 134
II. *A*, Character of small single-tube furnace; *B*, Enlarged carbon pots of new type 144
III. Character of furnace construction 166
IV. Arrangement of apparatus for feeding oil into cracking tubes 170
V. General view of balcony floor of furnace building, showing arrangement of oil pumps and pressure release valves 170
VI. *A*, Stirring rod, complete; *B*, Carbon accumulation on stirring rod 172
VII. *A*, Details of stirring-rod drive; *B*, Tar necks and carbon pots, showing arrangement of gate valves 174
VIII. A, Carbon formed in operation of benzene-toluene process; *B*, Arrangement of condensers for multiple-tube furnaces 178
IX. Laboratory at development plant, showing type of distillation apparatus for analyzing cracked oil 184
FIGURE 1. Chart showing some of the products obtainable from the destructive distillation of coal 22
2. Curves showing effects of pressure on proportions of illuminants, H_2 and C_2H_6 from oils cracked at 750° C. 32
3. Curves showing effects of pressure on proportions of fixed gases, carbon, tar, and CH_4 from oils cracked at 750° C. 32
4. Curves showing effects of pressure on proportions of illuminants, H_2, and C_2H_6 from oils cracked at a temperature of 900° C. 33
5. Curves showing effects of pressure on proportions of fixed gases, carbon, tar, and CH_4 from oils cracked at 900° C. 33
6. Curves showing effects of temperature and pressure on volume of illuminants in oil-gas cracking process 35