

CONTENTS

AROMATIC COMPOUNDS

(continued)

LIST OF PERIODICALS	XVII
OFFICIAL PUBLICATIONS	XIX
LIST OF COMMON ABBREVIATIONS AND SYMBOLS USED	XIX

Chapter XI. Quinones and Related Compounds of the Benzene Series

by Z. E. JOLLES

Introduction	687
a. General Methods of Formation of Benzoquinones	689
(i) Preparation of <i>o</i> -Benzoquinones, 690 - (ii) Preparation of <i>p</i> -Benzoquinones, 691	
b. Properties and Reactions	695
(i) Physical Properties, 695 - (ii) Oxidation, 695 - (iii) Action of Reducing Agents, 696 - (iv) Addition Reactions, 698 - (v) Action of Free Radicals, 702 - (vi) Action of Acyl Chlorides, 703 - (vii) Action of Nitrile Oxides, 704	
1. Individual Quinones	704
a. <i>o</i> -(1:2)-Benzoquinones	704
b. <i>p</i> -(1:4)-Benzoquinones	707
c. Quinhydrones and Other Addition Products	708
d. Aminobenzoquinones	710
e. <i>p</i> -Benzoquinone-sulphonic and -carboxylic Acids	710
f. Hydroxybenzoquinones	711
g. Polyquinoyl Compounds	714
2. Functional Derivatives of Quinones	714
a. Quinone-oximes	714
b. Quinone-imines	715
c. Quinonephenylhydrazones	719
d. Quinone-semicarbazones and -aminoguanidones	719
e. Indophenols, Indoanilines and Indamines	720
3. Pseudophenols, Methylenequinones and Quinols (Pseudoquinols).	725
a. Pseudophenols	725
b. Methylenequinones	726
c. Quinols or Pseudoquinols.	727

*Chapter XII. Phenolic Monohydric Alcohols,
Monoaldehydes, Monoketones and Monocarboxylic Acids*

by *W. J. HICKINBOTTOM and R. F. GARWOOD*

1. Phenolic Alkylamines	730
a. Monohydroxyphenylalkylamines	730
b. Di- and Tri-hydroxyphenylalkylamines.	732
2. Hydroxyphenyl Alcohols	733
Methods of Preparation	734
a. Monohydroxyphenyl Alcohols.	734
b. Di- and Tri-hydroxyphenyl Alcohols.	737
3. Hydroxyphenyl Aldehydes	737
Methods of Preparation	738
Reactions	741
a. Monohydroxybenzaldehydes and Their Homologues	741
b. Hydroxyphenyl Fatty Aldehydes	745
c. Dihydroxybenzaldehydes and Their Homologues	745
d. Tri- and Tetra-hydroxybenzaldehydes	749
4. Hydroxyphenyl Ketones	750
Methods of Preparation	750
a. Monohydroxyphenyl Ketones	751
b. Di- and Tri-hydroxyphenyl Ketones	753
5. Phenolic Monocarboxylic Acids	756
a. Acids of Monohydric Phenols	756
(i) Hydroxybenzoic Acids, 756 [Methods of Formation, 756 - Reactions, 757 - Derivatives of Salicylic Acid containing Phosphorus, 762 - Anhydro Derivatives of Salicylic Acid, 763 - Sulphur Derivatives of Salicylic Acid, 765 - Nuclear-substituted Salicylic Acids, 767] - (ii) Hydroxytoluic Acids, 769 - (iii) Higher Homologous Hydroxybenzoic Acids, 770 - (iv) Monohydroxyphenyl Fatty Acids, 771	
b. Acids of Dihydric Phenols	773
(i) Dihydroxybenzoic Acids, 773 - (ii) Dihydroxytoluic Acids, 777 - (iii) Dihydroxyphenyl Fatty Acids, 778	
c. Acids of Trihydric Phenols	780
Trihydroxybenzoic Acids, 780	
d. Depsides and Depsidones.	784
(i) Depsides, 787 - (ii) Depsidones, 795 - (iii) Depsidones containing Chlorine, 803 - (iv) Depsides of Gallic Acid, 804	
e. Hydrolysable Tannins	805
(i) Phenolcarboxylic Acids related to the Tannins, 806 - Gallotannins, 810 - (iii) Ellagitannins, 813	

*Chapter XIII. Dihydric and Polyhydric Alcohols
and Their Oxidation Products with Functional Groups in
Separate Side Chains*

by *W. J. HICKINBOTTOM and R. F. GARWOOD*

Side-chain Halogenated Xylenes	816
1. Dihydric and Trihydric Alcohols and Corresponding Amines.	817
Phenol-formaldehyde Resins	821

2. Aldehyde-alcohols	824
3. Dialdehydes and Trialdehydes	824
4. Di- and Tri-ketones	826
5. Hydroxyalkyl-carboxylic Acids	827
a. Hydroxymethylbenzoic Acids	827
(i) Phthalide, 828 - (ii) Phenolic Phthalides, 831 - (iii) Alkyl Phthalides, 832 - (iv) <i>m</i> - and <i>p</i> -Hydroxymethylbenzoic Acids, 832	
b. Hydroxymethylphenyl Fatty Acids	833
6. Aldehyde-acids	833
Phenolic Phthalaldehydic Acids.	837
7. Dialdehyde-carboxylic Acids	839
8. Ketocarboxylic Acids	840
9. Di-, Tri-, and Poly-carboxylic Acids	841
a. Benzenedicarboxylic Acids	841
(i) Phthalic Acid, 843 - (ii) Substituted Phthalic Acids, 851 - (iii) Homologues of Phthalic Acid, 855 - (iv) Hydroxyphthalic Acids, 855 - (v) <i>iso</i> -Phthalic Acid and Derivatives, 856 - (vi) Terephthalic Acid and Derivatives, 860	
b. Dicarboxylic Acids having One Nuclear and One Side-Chain Carboxyl Group	862
c. Dicarboxylic Acids with Carboxyl Groups in Separate Side Chains	864
d. Aldehydo- and Keto-dicarboxylic Acids	865
e. Tricarboxylic Acids	866
f. Tetra-, Penta- and Hexa-carboxylic Acids	867

*Chapter XIV. Phenyl Derivatives of Dihydric
and Polyhydric Alcohols and Their Oxidation Products*

by W. J. HICKINBOTTOM. R. F. GARWOOD and M. F. ANSELL

1. Phenylhalogenoalkanes.	871
2. Phenylhalogenohydroxyalkanes	872
3. Phenyl Derivatives of Dihydric and Polyhydric Alcohols	874
a. Dihydric Alcohols	874
b. Trihydric Alcohols.	877
c. Epoxides.	878
d. Phenyl Derivatives of Amino-alcohols	879
4. Phenyl Derivatives of Hydroxy-aldehydes	887
5. Phenyl Derivatives of Hydroxy-ketones	888
6. Phenyl Derivatives of Keto-aldehydes	895
a. α -Keto-aldehydes	895
b. β -Keto-aldehydes	897
c. γ - and δ -Keto-aldehydes	898
7. Phenyl Derivatives of Diketones.	898
a. α -Diketones	898
b. β -Diketones	899
c. Triketones	901

8. Phenyl Derivatives of Hydroxy- and corresponding Amino-fatty Acids	901
a. Monohydroxy- and Monoamino-acids	901
(i) Mandelic Acid and Related Compounds, 901 [Glycosides of Mandelonitrile, 904 - Substituted Mandelic Acids, 905] - (ii) Derivatives of Hydroxy- and Amino-propionic Acids, 906 [Thyroxine, 916] - (iii) γ - and δ -Hydroxy-acids, 922	
b. Dihydroxy-acids	923
c. Trihydroxy-acids	927
9. Phenyl Derivatives of Aldehydo-acids	927
10. Phenyl Derivatives of Keto-acids	928
a. α -Keto-acids	928
b. β -Keto-acids	935
c. γ - and δ -Keto-acids	939
d. Hydroxyketo-acids	941
11. Phenyl Derivatives of Diketo-acids	942
12. Phenyl Derivatives of Alkanedicarboxylic Acids	943
13. Phenyl Derivatives of Hydroxydicarboxylic Acids	946
14. Phenyl Derivatives of Keto-dicarboxylic Acids	948
15. Phenyl Derivatives of Alkanetricarboxylic Acids	949
16. Phenyl Derivatives of Keto-polycarboxylic Acids	950
17. Oxidation Products of Carboxyphenyl Dihydric and Polyhydric Alcohols	950
Diketo-tetracarboxylic Acids	954

Chapter XV. Benzene Derivatives with One or More Unsaturated Side Chains

by W. J. HICKINBOTTOM and M. F. ANSELL

1. Unsaturated Hydrocarbons and Their Nuclear Substituted Derivatives	955
a. Phenylolefines	955
(i) Styrene, 956 - (ii) Side-Chain Substituted Products of Styrene, 958 - (iii) Nuclear Substituted Styrenes, 960 - (iv) Homologous Alkenylbenzenes, 961	
b. Phenylacetylenes	963
c. Diolefines and Diacetylenes	965
d. Olefinic Phenols	967
(i) Monohydroxyphenylalkenes, 968 - (ii) Dihydroxyphenylalkenes, 972 - (iii) Trihydroxyphenylalkenes, 978 - (iv) Tetrahydroxyphenylalkenes, 978 - (v) Acetylenic Phenols, 979 - (vi) Polyolefinic Phenols, 979	
2. Phenyl Derivatives of Unsaturated Alcohols	980
a. Phenyl Olefinic Alcohols	980
b. Hydroxyphenyl Olefinic Alcohols	982
c. Phenyl Acetylenic Alcohols	983
3. Phenyl Derivatives of Unsaturated Aldehydes and Ketones	984
a. Phenyl Olefinic Aldehydes	984
b. Hydroxyphenyl Olefinic Aldehydes	986
c. Phenyl Polyolefinic Aldehydes	987
d. Phenyl Acetylenic Aldehydes	987
e. Phenyl Olefinic Ketones	987
f. Hydroxyphenyl Olefinic Ketones	989

g. Phenyl Acetylenic Ketones	990
h. Phenyl Diolefinic Ketones	990
i. Phenyl Olefinic Ketols	991
j. Phenyl Olefinic Diketones	991
4. Carboxylic Acids of Phenyl Olefines	992
a. Nuclear Carboxylic Acids	992
b. Phenyl Derivatives of Olefine Carboxylic Acids	992
(i) Cinnamic Acid and <i>allo</i> Cinnamic Acid, 995 - (ii) Cinnamic Acids Substituted in the Side Chain, 998 - (iii) Cinnamic Acids Substituted in the Ring, 999 - (iv) Cinnamic Acids Substituted in Both Ring and Side Chain, 1001 - (v) Homologous Cinnamic Acids, 1001 - (vi) Atropic and Related Acids, 1002 - (vii) Higher Phenylated Unsaturated Acids, 1003	
c. Phenolcarboxylic Acids with an Unsaturated Side Chain	1005
d. Phenolic Olefine Carboxylic Acids	1006
(i) Monohydroxyphenylolefine Carboxylic Acids, 1006 - (ii) Dihydroxyphenyl Olefine Carboxylic Acids, 1009 - (iii) Trihydroxycinnamic Acids, 1011	
e. Phenylacetylene Carboxylic Acids	1012
f. Phenyl Di- and Tri-olefine Carboxylic Acids	1014
g. Phenyl Derivatives of Olefinic Hydroxycarboxylic Acids	1017
h. Phenyl Derivatives of Unsaturated Keto-carboxylic Acids	1018
i. Phenyl Derivatives of Unsaturated Di- and Tri-carboxylic Acids	1021
j. Phenylene Compounds: Unsaturated Oxidation Products of the Dialkylbenzenes.	1024

Chapter XVI. The Phenylbenzene Group

by W. J. HICKINBOTTOM

1. Diphenyl and Its Derivatives	1028
a. General Methods of Formation of Diphenyl and its Derivatives	1028
b. Properties	1030
(i) Substitution in the Diphenyl Series, 1030 - (ii) Optical Activity in Diphenyl Derivatives, 1030 - (iii) Ring Formation in the 2:2'-positions, 1032	
c. Hydrocarbons	1033
d. Halogen Derivatives	1034
e. Nitrodiphenyls	1035
f. Amines of the Diphenyl Series	1036
Dialo and Azo Compounds derived from Benzidine, 1039	
g. Sulphonic Acids.	1041
h. Hydroxy Derivatives of Diphenyl	1042
i. Quinones.	1044
j. Aldehydes and Ketones of the Diphenyl Series	1045
k. Diphenylcarboxylic Acids	1046
(i) Monocarboxylic Acids, 1046 - (ii) Hydroxydiphenylcarboxylic Acids, 1047 - (iii) Diphenyldicarboxylic Acids, 1047	
2. Diphenylbenzenes, Terphenyls.	1049
3. Compounds with Four or More Phenyl Groups united	1052

Chapter XVII. Di-, Tri- and Tetra-phenylmethanes

by W. J. HICKINBOTTOM and S. H. HARPER

I. Diphenylmethane, Its Derivatives and Oxidation Products by W. J. HICKINBOTTOM	1054
a. Diphenylmethanes	1054
[General Methods of Formation: 1054] - (i) Hydrocarbons, 1055 - (ii) Nuclear Substituted Diphenylmethanes, 1055 - (iii) Diphenylmethanes Substituted in the Methylene Group, 1058	
b. Diphenylcarbinols or Benzhydrols	1059
(i) Aminobenzhydrols, 1060 - (ii) Hydroxybenzhydrols, 1061	
c. Diphenyl Ketones or Benzophenones	1062
[Functional Derivatives of Benzophenone, 1064] - (i) Halogen-substituted Benzophenones, 1065 - (ii) Nitrobenzophenones, 1066 - (iii) Aminobenzophenones, 1066 - (iv) Hydroxybenzophenones, 1070	
d. Diphenylmethanecarboxylic Acids.	1072
e. Diphenylcarbinolcarboxylic Acids	1073
f. Benzophenonecarboxylic Acids	1073
g. Benzylidiphenyls or Phenylidiphenylmethanes	1076
h. Dibenzylbenzenes	1077
2. Triphenylmethanes by S. H. HARPER.	1078
a. Hydrocarbons and Simple Derivatives	1078
b. Aminotriphenylmethanes.	1081
c. Hydroxytriphenylmethanes.	1082
d. Triphenylmethanecarboxylic Acids	1083
e. Triphenylmethanols (Triphenylcarbinols) and Their Derivatives	1084
(i) Carbinols, 1084 - (ii) Triphenylmethyl Halides, 1087	
f. Aminotriphenylmethanols (Aminotriphenylcarbinols) and Their Derivatives.	1092
Dyes from Di- and Tri-aminotriphenylcarbinol, 1096	
g. Hydroxytriphenylmethanols (Hydroxytriphenylcarbinols)	1103
h. Triphenylmethanolcarboxylic Acids (Diphenylphthalides)	1106
i. Phthaleins	1108
3. Tetraphenylmethanes by S. H. HARPER	1114

Chapter XVIII. Di- and Poly-phenyl Paraffins and Their Derivatives

by S. H. HARPER

I. Diphenyl Compounds in which Both Phenyl Groups are attached to the Same Carbon Atom	1116
a. 1:1-Diphenylalkanes.	1116
Halogeno-derivatives of 1:1-Diphenylethane, 1118	
b. 1:1-Diphenylalkenes.	1120
c. 1:1-Diphenylalkane-1:2-diols	1121
d. 2:2-Diphenylalkan-1-als	1122
e. 1:1-Diphenylalkan-2-ones and 3:3-Diphenylalkan-2-ones	1123
f. Diphenylketens	1125
g. 1:1-Diphenylalkanecarboxylic Acids	1127
h. 1:1-Diphenylalkenecarboxylic Acids	1130
i. Benzilic Acids	1133

2. Diphenyl Compounds with Phenyl Groups attached to Different Carbon Atoms	1134
a. Diphenylalkanes	1134
b. Diphenylalkenes	1137
(i) 1:2- (or $\alpha\beta$)-Diphenylethylenes, Stilbenes. 1137 - (ii) Nuclear Substituted Stilbenes. 1143 - (iii) Synthetic Oestrogens related to Stilbene. 1146 - (iv) Higher Diphenylalkenes. 1150	
c. Diphenylpolyenes	1150
(i) Type 1. $\alpha\omega$ -Diphenylalka- $\alpha\omega$ -dienes, 1150 - (ii) Type 2. Conjugated $\alpha\omega$ -diphenylpolyenes, 1151 - (iii) Type 3. $\alpha\omega$ -Diphenylcumulenes, 1157	
d. Diphenylacetylenes	1157
e. Diphenylpoly-yenes	1158
3. Oxidation Products of Diphenylalkanes with Phenyl Groups attached to Different Carbon Atoms	1159
a. 1:2-Diphenylethane-1:2-diols, Hydrobenzoin.	1160
b. Hydroxyketo- $\alpha\omega$ -diphenylalkanes	1163
c. Monoketo- $\alpha\omega$ -diphenylalkanes	1168
d. Diketodiphenylalkanes	1171
(i) Benzils. 1171 [Methods of Formation. 1172 - Properties. 1173] - (ii) Dibenzoylmethane and Homologous Diketo- $\alpha\omega$ -diphenylalkanes, 1178	
e. Keto- $\alpha\omega$ -diphenylalkenes.	1182
f. Diketo- $\alpha\omega$ -diphenylalkanes	1187
g. $\alpha\omega$ -Diphenylalkane-carboxylic Acids	1190
h. $\alpha\omega$ -Diphenylalkene-carboxylic Acids	1191
i. Keto- $\alpha\omega$ -diphenylalkane-carboxylic Acids	1193
4. Macrocyclic Compounds derived from $\alpha\omega$ -Diphenylalkanes	1195
Dibenzocycloalkadienes, Tribenzocycloalkatrienes	1195
5. Triphenylalkanes and Their Oxidation Products	1201
a. 1:1:1-Triphenylalkanes	1201
b. 1:1:2-Triphenylalkanes	1203
6. Tetraphenylalkanes and Their Oxidation Products	1206
a. $\alpha\alpha\omega\omega$ -Tetraphenylalkanes	1206
b. 1:1:1:2-Tetraphenylethanes	1207
c. $\alpha\alpha\omega\omega$ -Tetraphenylalkenes	1208
d. $\alpha\alpha\omega\omega$ -Tetraphenylpolyenes	1209
e. Tetraphenylcumulenes	1210
f. Tetraphenylethylene Glycols (Benzpinacols).	1213
g. 1:2:2:2-Tetraphenylethane-1-ones (Benzpinacones).	1214
h. Tetraphenylsuccinic Acid.	1215
7. Pentaphenylethanes	1216
8. Hexaphenylalkanes	1219

Chapter XIX. Monocyclic Quasi-Aromatic Compounds

by G. L. BUCHANAN and R. A. RAPHAEL

1. Tropolones	1221
a. Synthesis of Tropolones	1223
b. Chemical Properties	1228
(i) General Properties. 1228 - (ii) Nuclear Substitution. 1231 - (iii) Hydroxyl Group Replacement. 1234 - (iv) Rearrangements. 1240	

c. Fine Structure and Physical Properties	1243
d. Tropylium Salts.	1246
a. Quasi-Aromatic Derivatives of Cyclopentadiene	1247
Diazocyclopentadiene	1247
3. Biscyclopentadienylmetal Derivatives	1248
a. Synthesis	1249
b. Chemical Properties	1250
c. Physical Properties and Fine Structure	1251

Chapter XX. Aromatic Compounds *with* Condensed
Nuclei: Indene, *Naphthalene* and Other *Bicyclic* Compounds

by E. H. RODD and J. VAN ALPHEN

1. Indene and Hydrindene or Indane	1253
Methods of Formation,	1256
a. Indene and Its Derivatives	1256
(i) Indene, 1256 [Isomerism of Indene Derivatives, 1257] - (ii) Hydrocarbon Derivatives of Indene, 1258 - (iii) Substituted Indenes, 1260 - (iv) Indones, 1261	
b. Indane and Its Derivatives	1262
(i) Indane and Its Substitution Derivatives, 1263 - (ii) Indanones and Their Derivatives, 1265	
c. Di-indenyls and Related Compounds.	1268
d. Compounds with a Six-membered Ring condensed with Two Five- membered Rings	1272
2. Naphthalene and Its Derivatives	1273
Constitution of Naphthalene	1273
Formation of the Naphthalene Nucleus	1276
Fission of the Naphthalene Nucleus	1281
a. Naphthalenic Hydrocarbons	1283
b. Halogen Derivatives of Naphthalene.	1290
c. Sulphonic Acids.	1292
d. Nitro Derivatives of Naphthalene	1295
e. Nitrosonaphthalenes and Naphthylhydroxylamines	1297
f. Naphthylamines	1298
(i) Halogenonaphthylamines, 1301 - (ii) Naphthylaminesulphonic Acids, 1301 - (iii) Nitronaphthylamines, 1304 - (iv) Naphthylenediamines, 1305 - (v) Nitroamines, Diazo, Azo and Hydrazino Compounds, 1306	
g. Naphthols	1308
(i) Halogeno- and Nitro-naphthols, 1310 - (ii) Naphtholsulphonic Acids, 1311 [1-Naphtholsulphonic Acids, 1311 - 2-Naphtholsulphonic Acids, 1312] - (iii) Aminonaphthols, 1313 - (iv) Di- and Tri-hydroxynaphthalenes, 1316 - (v) Thionaphthols, 1317	
h. Naphthaquinones and Their Derivatives	1318
(i) Homologous α -Naphthaquinones, 1319 - (ii) Functional Nitrogenous Derivatives of Naphthaquinones, 1323 - (iii) Naphthaquinone-imines and -anils, 1324	
i. Alcohols of the Naphthalene Series	1325
j. Aldehydes	1326

k. Ketones	1327
l. Carboxylic Acids	1329
(i) Monocarboxylic Acids, 1329 - (ii) Naphthalene Di- and Poly-carboxylic Acids, 1332	
m. Dinaphthyl Compounds	1334
n. Di- and Tri-naphthylalkanes	1335
o. Dihydro- and Tetrahydro-naphthalenes and Their Derivatives.	1336
(i) Dihydronaphthalenes and Their Derivatives, 1337 - (ii) Tetralin and Its Derivatives, 1339 - (iii) Amino- and Hydroxy-tetralins, 1341 - (iv) Keto-tetrahydronaphthalenes, 1343 - (v) Oxidation Products of Alkyltetralins, 1346	
3. Perinaphthene or Phenalene	1348
4. Azulenes	1350
5. Benzocycloheptene and Related Compounds	1352

*Chapter XXI. Aromatic Compounds with Three Condensed Nuclei:
Anthracene, Phenanthrene and Related Compounds*

by S. COFFEY and J. VAN ALPHEN

Introduction	1355
Structure	1356
Geometry	1359
1. Anthracene and Its Derivatives	1359
a. Anthracene.	1359
(i) Methods of Formation and Synthesis, 1359 - (ii) Properties and Reactions, 1361	
b. Homologues of Anthracene	1368
c. Aminoanthracenes (Anthrylamines)	1370
d. Hydroxyanthracenes (Anthrols)	1371
e. Anthracene Carboxylic Acids and Their Functional Derivatives	1372
f. Anthracene Quinones or Anthraquinones and Their Derivatives	1373
(i) Anthracene-1:2-quinone, 1373 - (ii) Anthracene-1:4-quinone, 1374 - (iii) Anthracene-9:10-quinone, Anthraquinone, 1374 - (iv) Reduction Products of Anthraquinone, 1380 - (v) Homologues of Anthraquinone, 1388 - (vi) Halogenoanthraquinones, 1390 - (vii) Nitroanthraquinones, 1391 - (viii) Nitrosoanthraquinones, 1392 - (ix) Aminoanthraquinones, 1393 - (x) Hydroxyanthraquinones, 1400 - (xi) Homologues of Hydroxyanthraquinones, 1411 - (xii) The Reduction Products of Hydroxyanthraquinones, 1414 - (xiii) 1-Hydroxy-4:9-anthraquinones, 1417	
g. Aldehydes, Ketones and Carboxylic Acids of Anthraquinones	1418
(i) Aldehydes, 1418 - (ii) Aroylanthraquinones, 1419 - (iii) Anthraquinone Carboxylic Acids, 1419	
h. Anthrapolyquinones and Their Derivatives	1421
i. Dianthryls and Their Derivatives	1422
2. Phenanthrene and Its Derivatives	1426
a. Phenanthrene.	1426
Methods of Formation and Synthesis, 1426 - Properties and Reactions, 1430	
b. Homologues of Phenanthrene	1433
c. Aminophenanthrenes or Phenanthrylamines	1435

d. Hydroxyphenanthrenes or Phenanthrols	1435
e. Phenanthrene Aldehydes and Ketones	1437
f. Phenanthrene Carboxylic Acids	1438
g. Phenanthrene Quinones	1439
h. Diphenanthryls	1442
3. Colchicine	1442
4. Dibenzocyclo-octadiene.	1444

Chapter XXII. Aromatic Compounds with Condensed Nuclei:

Fluorene, Acenaphthene and Polycyclic Compounds

by G. M. BADGER and J. W. COOK

1. Fluorene Group	1447
Methods of Formation.	1448
2. Acenaphthene Group.	1461
3. Condensed Aromatic Systems with more than Three Six-membered Rings	1476
Reactivity in Polycyclic Aromatic Compounds, 1476 - Reactivity of Carbon—Carbon Bonds in Condensed Aromatic Systems, 1478	
a. Systems with Four Rings	1480
Synthetic Methods, 1481— Reactions and Derivatives, 1484— Antibiotics derived from Naphthacene, 1489	
b. Systems with Five Rings.	1505
c. Systems with Six or More Rings	1521
d. Polycyclic Compounds with Seven- and Eight-membered Rings . .	1532
INDEX	1535