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CALCIUM CARBIDE  
MANUFACTURING  
AP-42 Section 8.4  
Reference Number  
11

# MANUAL FOR PROCESS ENGINEERING CALCULATIONS

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TABLE H-3.—ANALYSES OF COKES  
(Marks, "Mechanical Engineers' Handbook," 5th ed., McGraw-Hill Book Company, Inc., New York, 1951)

Kind of process	As-received basis									
	Proximate, %				Ultimate, %					
	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulphur	High heat value, Btu/lb
Gas-works coke:										
Horizontal retorts.....	0.8	1.4	88.0	9.8	0.7	86.8	1.1	0.9	0.7	12,820
Vertical retorts.....	1.3	2.5	86.3	9.9	1.1	85.4	1.4	1.5	0.7	12,770
Narrow coke ovens.....	0.7	2.0	85.3	12.0	0.6	84.6	1.2	0.9	0.7	12,550
By-product coke.....	0.8	1.4	87.1	10.7	0.8	85.0	1.3	1.2	1.0	12,690
Beehive coke.....	0.5	1.8	86.0	11.7	0.8	84.4	1.2	0.9	1.0	12,527
Low-temperature coke.....	0.0	9.8	83.5	6.7	3.2	84.2	1.9	3.2	0.8	14,030
Low-temperature coke.....	2.8	15.1	72.1	10.0	3.5	74.5	1.6	8.6	1.8	12,600
Pitch coke.....	0.3	1.1	97.6	1.0	0.6	96.6	0.7	0.6	0.5	14,097
Petroleum coke.....	1.1	7.0	90.7	1.2	3.3	90.8	0.8	3.1	0.8	15,060

TABLE H-4.—COMBUSTION PROPERTIES OF COAL AND COKE CONSTITUENTS

Element	Carbon	Hydrogen	Oxygen	Nitrogen	Sulphur
Formula.....	C	H	O	N	S
Atomic weight.....	12.010	1.008	16.000	14.008	32.06
Free element at 60°F, 30 in. Hg.....	Solid, graphite	Gas, H <sub>2</sub>	Gas, O <sub>2</sub>	Gas, N <sub>2</sub>	Solid, rhombic
Gross heating value, Btu/lb:					
1. As free element.....	14,100	61,042	0	0	3,983
2. Apparent in coal (Dulong).....	15,544	62,100	-7,762	0	4,050
Theoretical air required:					
1. Weight, lb/lb combustible.....	11.48	34.26	-4.31	0	4.30
2. Volume, SCF/lb combustible....	150.0	447.8	-56.3	0	56.2
Primary products of combustion with oxygen:					
1. Formula.....	CO <sub>2</sub>	H <sub>2</sub> O	*	N <sub>2</sub>	SO <sub>2</sub>
2. Weight, lb/lb combustible.....	3.668	8.936	.....	1.000	1.998
3. Volume, SCF/lb combustible....	31.38	188.7	.....	13.52	11.69
Nitrogen† in products of combustion with theoretical air:					
1. Weight, lb/lb combustible.....	8.82	26.31	-3.31	1.00	3.30
2. Volume, SCF/lb combustible....	118.5	353.6	-44.5	13.5	44.4

\* Oxygen included in products of combustion of the other elements.  
† Includes other inert gases reported as nitrogen in standard gas analyses.

ONS  
S  
d moisture  
e basis  
% O % N % S  
2.0 0.7 0.4  
2.4 1.3 0.7  
3.8 1.5 0.8  
7.2 1.9 1.2  
7.5 1.3 4.9  
9.8 1.7 1.0  
8.9 2.1 0.8  
18.8 1.5 1.2  
15.3 1.8 0.5  
12.5 1.4 0.8  
16.2 1.1 0.8  
21.1 1.0 1.2  
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31.  
7, Pa. Tech  
7, Ill. Tech  
ounty, Wash.  
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in coal.  
ultimate  
H-1, H-3,  
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