

stituents of coals can, therefore, be considered as concentrated in the volatile matter. One index of the quality of the volatile matter, its heating value, is perhaps the most important property as far as combustion is concerned, and it bears a direct relation to the properties of the pure coals (moisture and mineral matter free). The volatile matter in the coals of lower rank, where the conversion of carbohydrates to hydrocarbons has not progressed far, is relatively high in water and CO, and, consequently,

low in heating value. In coals of higher rank, the volatile matter is relatively high in hydrocarbons, such as methane (CH<sub>4</sub>), and, consequently, relatively high in heating value.

To establish reasonably accurate heating values for the volatile matter, the analyses and heating value of the coal must be converted to the mineral matter free basis. The only difference in the conversion used for this method and the conversion used in the ASTM standard D-388-38 is that half the sul-

TABLE 9

Classification of Coals by Rank,<sup>a</sup> ASTM D 388-38

FC = Fixed Carbon; VM = Volatile Matter; Btu = British Thermal Units

Class	Group	Limits of Fixed Carbon or Btu Mineral Matter Free Basis	Requisite Physical Properties
I Anthracite	1. Meta-anthracite	Dry FC, 98% or more. (Dry VM, 2% or less)	Nonagglomerating <sup>b</sup>
	2. Anthracite	Dry FC, 92% or more and less than 98%. (Dry VM, 8% or less and more than 2%)	
	3. Semi-anthracite	Dry FC, 86% or more and less than 92%. (Dry VM, 14% or less and more than 8%)	
II Bituminous <sup>c</sup>	1. Low volatile bituminous	Dry FC, 78% or more and less than 86%. (Dry VM, 22% or less and more than 14%)	Either agglomerating or nonweathering <sup>f</sup>
	2. Medium volatile bituminous	Dry FC, 69% or more and less than 78%. (Dry VM, 31% or less and more than 22%)	
	3. High volatile A bituminous	Dry FC, less than 69%. (Dry VM, more than 31%); and moist <sup>e</sup> Btu, 14,000 or more	
	4. High volatile B bituminous	Moist <sup>e</sup> Btu, 13,000 or more and less than 14,000*	
	5. High volatile C bituminous	Moist Btu, 11,000 or more and less than 13,000*	
III Sub-bituminous	1. Sub-bituminous A	Moist Btu, 11,000 or more and less than 13,000*	Both weathering and nonagglomerating
	2. Sub-bituminous B	Moist Btu, 9,500 or more and less than 11,000*	
	3. Sub-bituminous C	Moist Btu, 8,300 or more and less than 9,500*	
IV Lignite	1. Lignite	Moist Btu, less than 8,300	Consolidated Unconsolidated
	2. Brown coal	Moist Btu, less than 8,300	

<sup>a</sup>Does not include a few coals of unusual physical and chemical properties which come within the limits of fixed carbon or Btu of the high volatile bituminous and sub-bituminous ranks. <sup>b</sup>If agglomerating, classify in low volatile group of the bituminous class. <sup>c</sup>Moist Btu refers to coal containing only its natural bed moisture. <sup>d</sup>There may be noncaking varieties in each group of the bi-

bituminous class. <sup>e</sup>Coals having 69 per cent or more fixed carbon on the dry, mineral matter free basis shall be classified according to fixed carbon regardless of Btu. <sup>f</sup>There are three varieties in the high volatile C bituminous coal group, 1) agglomerating and nonweathering, 2) agglomerating and weathering and, 3) nonagglomerating and nonweathering.