

***Characterization
of Biomass for
Thermo-Processing
to BioPower & BioFuels***



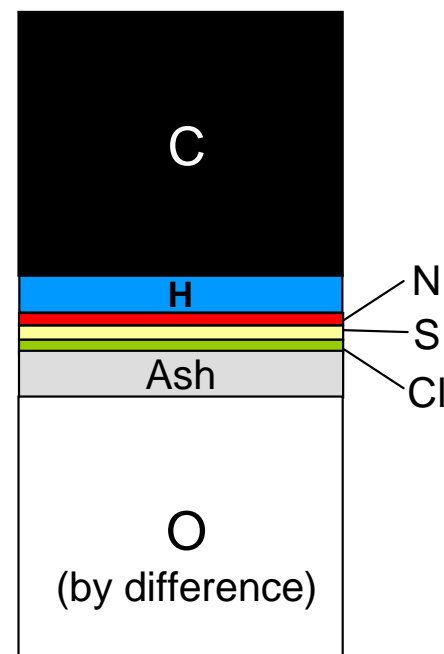
Characterization of Biomass

- Organic constituents
 - Cellulose, hemicellulose, lignin, extractives, etc.
 - Form and structure
- Elemental analysis including metals, chloride, sulfur, etc.
 - C-H-N-S-Cl-K-Na-Ca-etc.
- Bioprocessing characteristics
- Thermochemical Processing characteristics

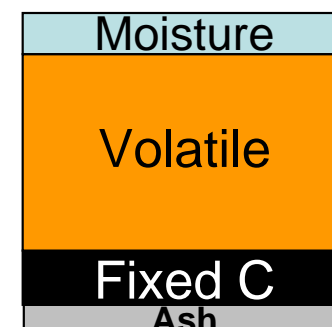
Conventional Analysis Methods

Methods for Biomass Fuel

Heating value	ASTM D2015, E711
Bulk density	ASTM E873
Ultimate elemental analysis	
C,H	ASTM E777
N	ASTM E778
S	ASTM E775
Cl	ASTM E776
Ash elemental	ASTM D1102 (wet ashing) + various ASTM methods

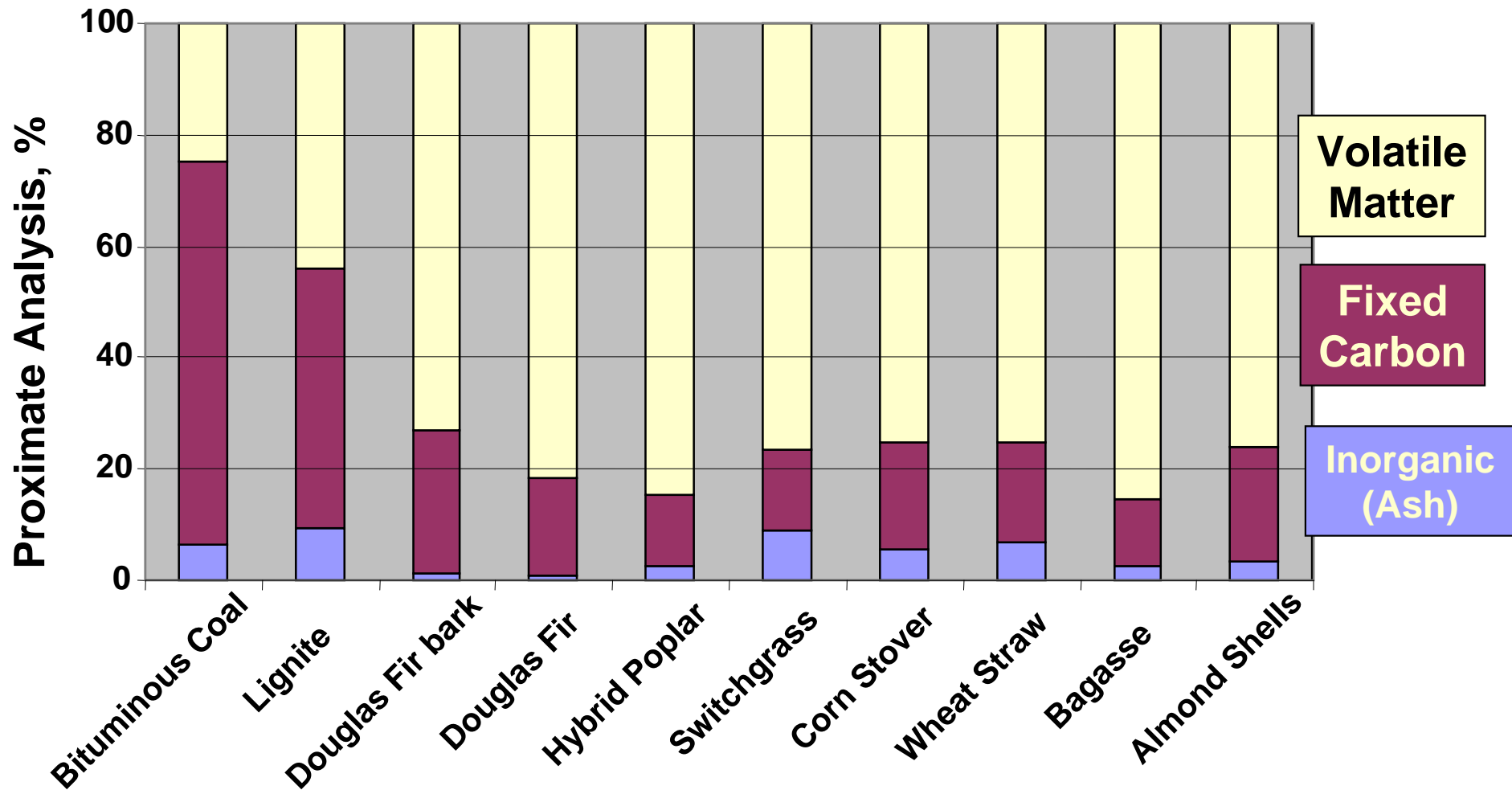


Proximate analysis	
Moisture	ASTM E871
Ash	ASTM E830, ASTM D1102
Volatiles	ASTM E872/E897
Fixed carbon	By difference/ Coulometric

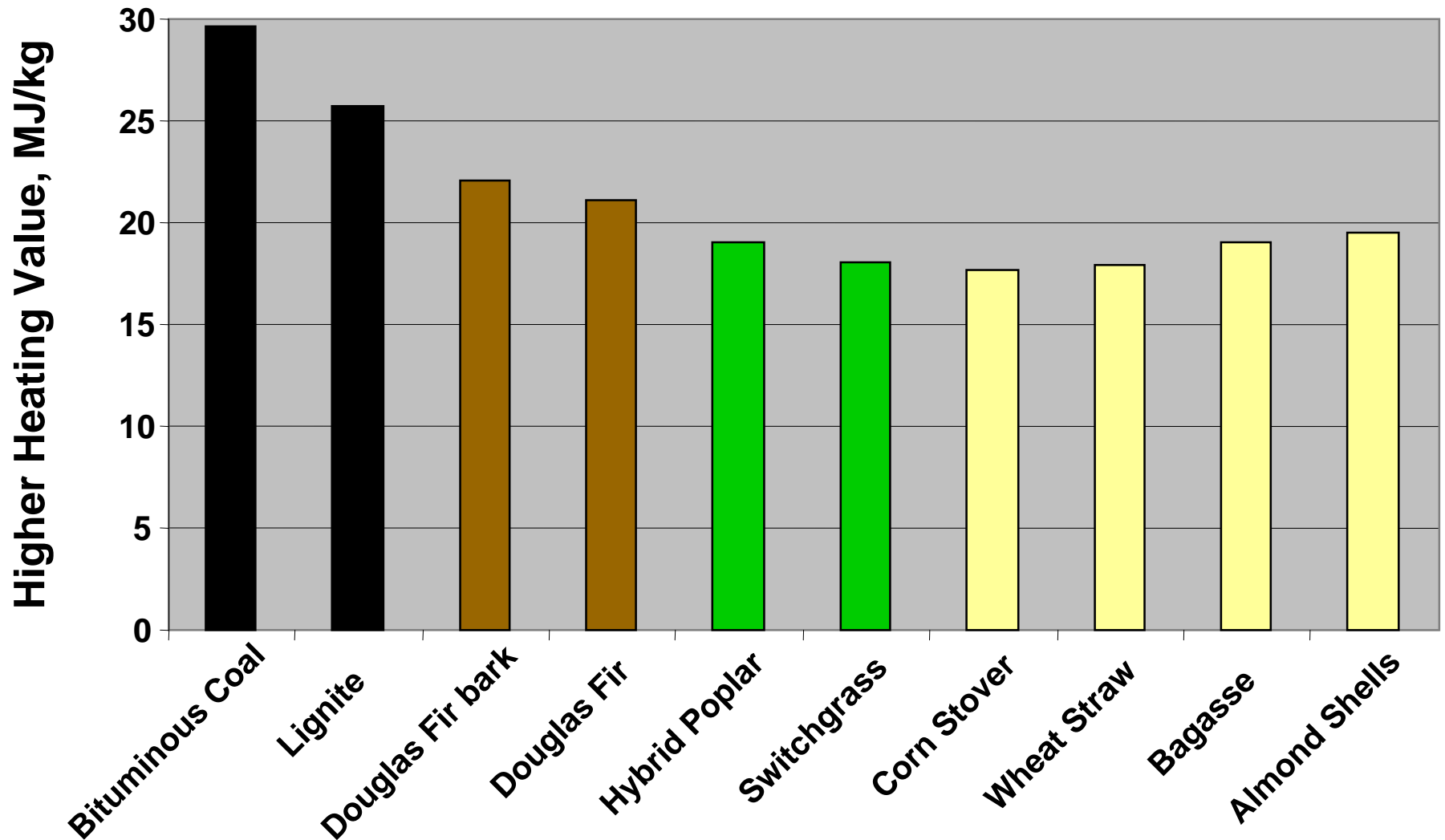


Ash melting range **Differential scanning calorimetry**

Proximate Analysis of Coals and Various Biomass Fuels and Wastes



Higher Heating Values of Coals and Various Biomass Fuels



Variability of Biomass

- Bole wood, bark, branches, needles from one location
 - Variation among components
 - Variation along tree height
 - Variation among trees of the same age
 - Variation with age of trees
- Effect of location (coastal, piedmont, etc.)
- Effect of species (loblolly pine, slash pine, etc.)