CLASSIFICATION OF COMPOSITE MICROLITHOTYPES OF LIGNITE

G. K. B. NAVALE AND B. K. MISRA

Birbal Sahni Institute of Palaeobotany, Lucknow

ABSTRACT

An approach to classification of microlithotypes of lignites is made in this paper. Four commonly occurring composite genetic microlithotypes in lignite are considered here. They have been termed as Humite, Clarite, Detrite and Inertite. The relation between them is shown in a tetrahedron diagram. The mixed microlithotypes occupy intermediate positions.

INTRODUCTION

The classification and terminology of coal is fairly well standardized although it falls short in classifying all the coals of the world. However, continuous efforts are being made by the International Coal and Lignite Nomenclature Subcommittee to make the nomenclature and classification to near perfection. As regards lignite although macerals or microscopic organic units are well designated and classified, yet the terminology and classification of microlithotypes are not standardized. Several proposals in this respect, are being considered by the International Committee for Coal Petrology for uniform usage and framing up of the international nomenclature.

It is felt by the authors that it would be reasonable to propose the basic composite microlithotypes found in lignites. While doing this, we have adopted the international standards (I.C.C.P., 1963, 1971, 1975) and modalities without much deviation from the basic structure.

COMPOSITE MICROLITHOTYPES

After studying various types of Indian lignite, the authors are of the view that as in coals (NAVALE, 1979), in lignites also, organic microconstituents known as macerals combine to form primary lignite composite types. They are formed from resembling groups of lignite types or varieties derived from certain type of source material under particular biogeographical conditions and typical environmental patterns. The primary lignite type is mainly differentiated by microscopic criteria. The stress is laid on the composition of source material rather than on rock type analysis in grouping the lignite varieties. In other words, the approach is more genetic. The lignite types are associated in contiguous layers to form composite lignite types but a lignite bed, entirely of one particular lignite variety is not a composite lignite type.

The microlithotypes which occur in association forming bands are arbitrarily delimited and classified conventionally. This artificial grouping is found to agree well with geological and technological behaviour. Likewise the primary composite lignite microlithotype groupings, although arbitrary, explain much of environmental, depositional and heterogeneous complexities of lignites.

Geophytology, **10** (1) : 54-57, 1980.

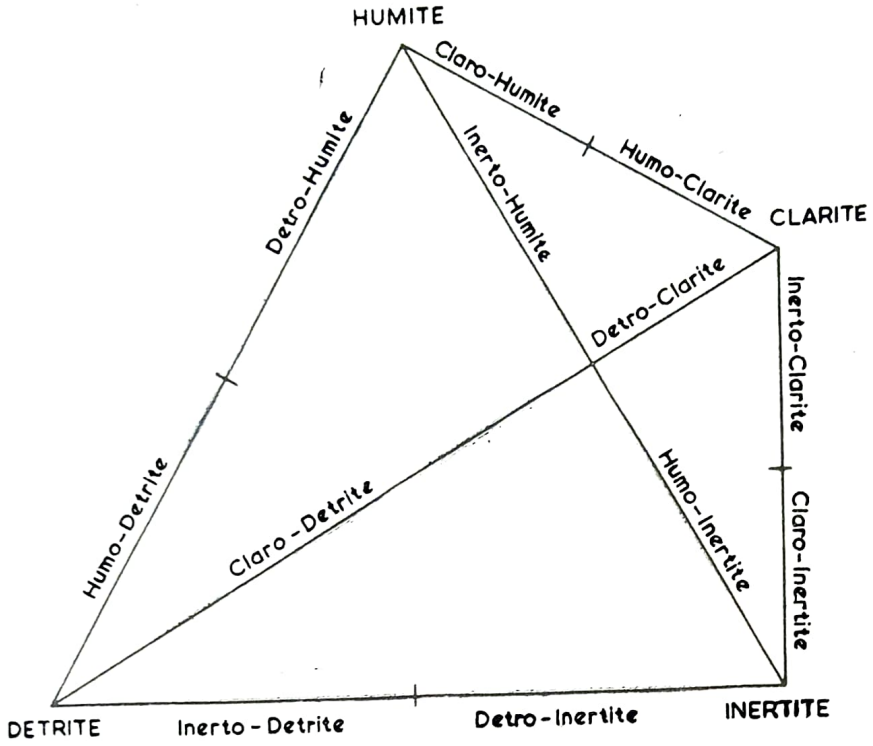

FIG. 1- TETRAHEDRON SHOWING RELATION OF MICROLITHOTYPES

MICROLITHOTYPES

The microlithotypes are recognised by virtue of their maceral associations and also upon the quantitative presence of various macerals. They are categorized into three microlithotype groups—monomaceral, bimaceral and trimaceral groups. We propose to follow two conventions (as in the case of hard coals—I.C.C.P., 1963) to demarcate microlithotypes in lignites.

(*a*) Minimum band width of the microlithotpyes to be recorded should be 50 microns (50×50 μm surface area)

(*b*) A monomaceral or bimaceral microlithotype should contain not less than 90 per cent of the main maceral/macerals and the remaining 10 per cent may be constituted by accessory macerals.

The monomaceral microlithotype group is chiefly composed of macerals of only one maceral group (humite-contains mainly huminite macerals) and can be subdivided into different types e.g., humotelite, humocollite, etc.

The bimaceral microlithotype group can be subdivided into subgroups based on the preponderance of a particular maceral group, i.e. Clarite into Clarite H (humite rich) and Clarite E (exinite rich).

The trimaceral microlithotype group denotes the combination of three microlithotypic groups, for example--Inerto-humo-detrite, Humo-detro-clarite, etc. (Table 1).

Basically all lignites may be categorized under three primary composite microlithotype groups, viz., Humite, Clarite (not Liptite because monomaceral association of this group is rarely observed) and Inertite. These three microlithotype groups of lignite established here are conceptually almost identical to microlithotypes (Vitrite, Clarite and Inertite) of hard coals (I.C.C.P. 1963) as the former groups are the precursors of the latter.

Table 1

SUMMARY OF THE MICROLITHOTYPES

(*a*) *Monomaceral Association*	
HUMITE	
Humotelite	90% vol. Humotelinite 10% vol. Accessory macerals
Textite (*Xylite*)	90% vol. Textinite (xylinite) 10% vol. Accessory macerals
Ulmite	90% vol. Ulminite 10% vol. Accessory macerals
HUMOCOLLITE	90% vol. Humocollinite 10% vol. Accessory macerals
Gelite	90% vol. Gelinite 10% vol. Accessory macerals
Corpohumite	90% vol. Corpohuminite 10% vol. Accessory macerals
LIPTITE	90% vol. Sporinite/Resinite/Cutinite/Alginite, etc. 10% vol. Accessory macerals
INERTITE	
Fusite	90% vol. Fusinite 10% vol. Accessory macerals
Semifusite	90% vol. Semifusinite 10% vol. Accessory macerals
Sclerotite	90% vol. Sclerotinite 10% vol. Accessory macerals
(*b*) *Bimaceral Association*	
Ulmo-Textite	60—90% vol. Textinite 10—40% vol. Ulminite up to 10% vol. Accessory macerals
Texto-Ulmite	60—90% vol. Ulminite 10—40% vol. Textinite up to 10% vol. Accessory macerals
CLARITE	
Telo-Resite	60—90% vol. Resinite 10—40% vol. Telinite up to 10% vol. Accessory macerals
Reso-Telite	60—90% vol. Telinite 10—40% vol. Resinite up to 10% vol. Accessory macerals
Fuso-Gelite	60—90% vol. Gelinite 10—40% vol. Fusinite up to 10% vol. Accessory macerals
Gelo-Fusite	60—90% vol. Fusinite 10—40% vol. Gelinite up to 10% vol. Accessory macerals

DETRITE

Attrite	60—90% vol. Huminite macerals 10—40% vol. Liptinite or Inertinite macerals up to 10% vol. Accessory macerals
Densite	60—90% vol. Mostly gelified huminite macerals 10—40% vol. Liptinite or Inertinite macerals up to 10% vol. Accessory macerals

(*c*) *Trimaceral association*

TRIMACERITE

In this microlithotype group all three maceral groups (Huminite, Liptinite and Inertinite) are present to the extent of more than 10 per cent. Depending upon the preponderance of the maceral groups, the trimacerite microlithotype is designated, e.g.,

Inerto-clarite, Claro-inertite, Inerto-detrite, Detro-inertite.

Humo-inerto-liptite, Lipto-inerto-humite, Inerto-humo-liptite, etc.

However, in lignites, the typical microlithotype group of Durite found in Palaeoeoic coals is absent altogether. Instead, another mixed microlithotype group—Detrite which is characteristic of lignites takes the place of fourth microlithotype group. For microlithotypes of lignite, the authors distinguish Humodetrite (Humodetrinite) as Detrite microlithotype group, mainly for the following reasons :

(*a*) The detrite (Humodetrite) group, proposed here, differs from the humite group because of the presence of several macerals of other groups impregnated in huminitic ground mass and also the quantity of various macerals may vary widely making it more complex in nature.

(*b*) It is an ubiquitous microlithotype of lignite and occurs abundantly.

(*c*) It forms quite early during coalification process from a typical source material and also under special depositional and environmental conditions.

(*d*) Megascopically also it is recognizable in lignite seams as light layers.

The microlithotype groups are resolvable into several microlithotypes which are interrelatable. Their interrelationships have been shown on a tetrahedron diagram (Fig. 1.)

REFERENCES

International Hand Book of Coal Petrography (1963). *Intern. Committee for Coal Petrology, 2nd ed., Centre National Recherche Scientifique*, Paris.

International Hand Book of Coal Petrography (1971, 1975). *Intern. Committee for Coal Petrology, Suppl. to 2nd ed., Centre National Recherche Scientifique* ; Paris.

Navale, G. K. B. (1979). Lower Gondwana Pirmary Composite Genetic Coal types of India. *C. R. 8th Congr. Int. Strat. Geol. Carbonif* **4** :