

Report of Commission III

Application of Coal Petrology to Utilisation

Chair: Rosa Menéndez

Secretary: Henrik I. Petersen

The session of Commission III was held on Monday the 13th August from 14.30-19.30 and was attended by 32 members and guests.

The chair started the session by highlighting the status of the working groups (WG) of Commission III:

1. Coal Blends WG; in good condition
2. Automation WG; no WG at the moment
3. Coke Petrography WG; needs a new convenor
4. Inertinite in Combustion WG; in its final stage
5. Combustion; in good condition

During the year the chair has asked for new WG, but only one suggestion has been received from INCAR.

Coal Blends Working Group

Convenor: I. Suárez-Ruiz

The convenor presented a report on the 2001 round Robin exercise. The participants of the exercise were asked to determine:

- the composition of the blend in terms of the percentage of low, medium and high rank coal
- the mean random reflectance of each coal in the blend

Point-counting and reflectance measurements should be carried out separately, and the latter had to be performed before point-counting. The aim of the exercise was to establish the effectiveness of petrographic methods to determine the composition of complex coal blends.

A total of 24 participants sent their results, and 22 results were obtained by conventional manual microscopy (1 result from two participants), while one result was from an automation system.

A new blend made up of 3 high inertinite (>25 vol.%) bituminous coals of Carboniferous age was used in the exercise. The coals in the blend were:

- Elk Run Coal, USA: 0.88 %Ro
- Poruba Coal, Czech Republic: 1.07 %Ro
- Indiana Ridge Coal, USA: 1.56 %Ro

The coals were blended (after correction for density) in the following proportions:

- Elk Run Coal: 21%
- Poruba Coal: 49%
- Indiana Ridge Coal: 30%

The convenor did not consider the results as good and accurate as those obtained in previous exercises. Difficulties in identifying the coals in the blends were attributed to:

- the complexity of the blend
- the close rank of the coals in the blend
- the Elk Run and Indiana Ridge coals were also blends of coals or groups of coals of similar characteristics
- difficulty in grouping of vitrinite with similar vitrinite reflectance to the different coals in the blend.

The spreading of vitrinite reflectance results was slightly higher than in previous exercises, but the composition of the blend was better determined from vitrinite reflectance than from point-counting analysis. Only 9 determinations of the blend composition derived from vitrinite reflectance measurements differed less than 5% from the actual value. However, only 3 determinations of the coal blend derived from point-counting differed less than 5% from the actual value.

Based on these results the convenor concluded that it is possible to make an accurate identification and quantification of coal blend components through vitrinite reflectance measurements and point-counting analysis.

Several individuals from the audience were more optimistic with regard to the results than the convenor.

It was decided to repeat the exercise with 3 individual coals. Joan Esterle offered to provide 1 to 2 coals (1.2 %Ro and 1.5 %Ro). Dr. A.C. Cook also offered a coal with a vitrinite reflectance of 1.0 %Ro.

Automation Working Group

Convenor: D. Pearson

D. Pearson was proposed by the chair and accepted by the members of Commission III as convenor of this WG. He will contact those interested in participating in the activities of the WG to arrange future activities.

D. Pearson explained the concepts of the Automation system at his laboratory, and how it is routinely used.

Coke Petrography Working Group

No convenor at the moment

The WG is looking for a new convenor as Rafael Javier has been retired. Adrian Reifenstein was suggested as new convenor, and it was decided to contact him.

Inertinite in Combustion Working Group

Convenor: A. Gómez-Borrego

The convenor summarised the activities of the WG from 1995-2001.

The final report, a CD, was presented but the convenor stressed that it does not have to be the final document. The char images are organised first by the rank of the parent coal and within each rank interval seven different groups might be selected according to the origin (inertinite-derived, vitrinite-derived), the behaviour (fused/unfused) and the optical texture (isotropic/anisotropic). The CD will be distributed to the members of the WG for comments and final agreement and afterwards sent to the Editor distribution.

A detailed presentation of the causes of disagreement of classification of various particles between participants in the round robin exercises was provided.

Finally the chair thanked A. Gómez-Borrego for the great job she had done as convenor.

Combustion Working Group

Convenors: D. Álvarez and E. Lester

E. Lester gave a presentation on the recent achievements of the WG and this year's exercise. The achievements include:

- universal identification of chars based on the developed classification system is possible
 - a char atlas has been developed; the new char atlas was presented
 - a new software to perform char analysis has been developed
- This year's exercise used a new-developed software, which recorded:
- the time used by the analyst to take a decision
 - the total time used
 - if the analyst was irresolute with regard to his or her decision

Like previous years the exercise should be performed on char images supplied on a CD. The current classification system should be used to classify the chars. Each char was shown in reflected white light and with crossed polars. Typical examples of the various morphotypes were also supplied on the CD.

Among the results of this year's exercise were that there was only 100% agreement of 6 chars out of 170, and it was the most simple char types (tenuisphere, tenuinetwork, crassisphere). However, 7 analysts from previous years had 100% agreement of 58 chars.

D. Álvarez talked about the possibility of carrying out image analysis of chars. He showed examples of measured porosity of char particles by image analysis and the implications for classifying these chars.

Finally, theories of combustion processes were presented.

For the future it was decided to produce a CD with chars of different burnout.

New Working Groups

The chair stressed the need for new ideas and WG for Commission III in order to strengthen it. The following WG were suggested:

- Improved Image Analysis for general purposes (i.e., porosity in coals and

carbonaceous materials)

- Application of Reflectance to Estimate Structural Order; supported by XRD and TEM
- Fly Ash characterisation by optical microscopy and SEM

It was agreed that Cristina and Maria Mastalerz searched on the first topic to see how to proceed on specific topics. The second WG on the Application of Reflectance to Estimate Structural Order was accepted and Slawomira Pusz will be the convenor of this new WG. Finally, concerning the third proposal, Maria Mastalerz mentioned a possible overlapping with the Environmental WG.

/Copenhagen, 11.09.01