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Emission Differences of New Coal Fuels by Ger Stoves Combustion Tests



Summary

- (1) Hot start is preferred for fuel evaluation combustion test because dust emission by ignition materials is not constant.
- (2) Volatile matter content and dust emission are in correlative relation.
- (3) Fuel ash content and dust emission are not in correlative relation.
- (4) Obligation items of MNS (Mongolian National Standard) is to be minimized for fuel quality control, and other items are to be defined as recommendations
- (5) The current subsidies are not suitable to promote low air pollutant emission fuels. Subsidies by fuel types are to be studied well by professional agencies.
- (6) Draft MNS of the combustion testing method was proposed.

JICA (Japan International Cooperation Agency) Mongolia Office

Location: 7F, Bodi Tower Sukhbaatar Square 3, Ulaanbaatar, Mongolia
Postal Address: Central P.O.Box 682, Ulaanbaatar 211213, Mongolia
TEL: 976-11-325939, 312393 FAX: 976-11-310845
<http://www.jica.go.jp/mongolia/index.htm>

Project Office

c/o: AQDCC (Air Quality Department of Ulaanbaatar City)
4F, Khangarid Building, Chingeltei District, Jigjidjav St-9, Ulaanbaatar, Mongolia
TEL: 976-11-318551 FAX: 976-11-318551
<http://www.airquality.ub.gov.mn/>

Outline of Capacity Development Project of JICA

“Capacity Development Project for Air Pollution Control in Ulaanbaatar City Phase2” has been implemented from November 2013 to May 2017, to accomplish the goal listed below.

- Overall Goal: Measures for emission reduction of air pollutants will be strengthened in Ulaanbaatar City.
- Project Purpose: Capacity for air pollution control in Ulaanbaatar City is strengthened, paying special attention to the development of human resource and coordinating mechanism of the AQDCC and other relevant agencies among other aspects of the capacity development.

According to the result of Phase 1 from March 2010 to March 2013, Mongolian side requested for a further capacity development. New project was adopted to satisfy the request, and to accomplish the goal, 9 “outputs” were specified through 54 “Activities”.

This newsletter introduces 5 activities concerning carbon related new coal fuels (Table 1) and emission differences of new coal fuels based on ger stove combustion test.

Outline of Emission Measurement of New Coal Fuels

(1) Background

One of the main air pollution sources in winter of Ulaanbaatar is the coal combustion in ger area. According to the new coal fuel promotion by Mongolian government, types of new coal fuels increased, but fuel evaluation method is incomplete. Using dust and gas emission measurement equipment, donated in Phase1 of this Project, dust and gas emission from stoves by burning new coal fuels were measured through the combustion test. Also, the new coal fuels were evaluated by the relations of the fuel quality and dust/gas emission. In addition, capacity for the combustion test and the fuel evaluation method above was developed.

(2) Dust/Emission Gas Measurement

The laboratory of AQDCC carried out the combustion test. From September 18th to October 28th of 2014, dust and gas emission were measured for 5 types of new coal fuels and ignition materials. The test cycle was based on real combustion scene of ger stoves, and all of the data were measured by the members of Mongolian Counterpart.

(3) Utilization of Measured Results

The measured results are summarized and reported in a meeting for NAMEM, MNEGD, Ministry of Mines, Mineral Resources Authority, SHEET, university experts, new coal fuel manufacturers, and etc. Many valuable comments and proposals were given in the meeting. Thus, the report meeting was meaningful to continue to support the promotion of new coal fuels. Combustion data will be reviewed by comments and proposals for the next meeting.

Table1: Project Activities, Concerning Emission Measurement of New Coal Fuels

Output 1: Capability of emission source monitoring is strengthened.	
Activity 1-1	Self-sustained emission measurement is reinforced.
Output 4: Decision making process for air pollution control is improved, by utilizing technical abilities of AQDCC and the relevant agencies.	
Activity 4-1	Decision making process in air pollution control utilizes improved information and technical capabilities of AQDCC, NAMEM and the relevant agencies.
Activity 4-4	AQDCC and NAMEM provide technical advices on air pollution control measures for decision makers.
Output 7: Capability of AQDCC and the related agencies to regulate and to control emission sources is strengthened.	
Activity 7-4	Appropriateness and relevance of MNS including parameters and values for regulation, and measurement methods are examined. If necessary, revision of MNS is proposed.
Output 8: Emission control measures at major polluters are enhanced by AQDCC and the related agencies.	
Activity 8-1	JICA experts assist entities (power plants, HOB, industries, and others) of pollution sources to elaborate air pollution control measures.

Dust and Gas Emission Measured

Following characteristics are found by emission measurement of various new coal fuels by ger stove combustion test.

- (1) In case of coal, coal briquette, semi-coke, and semi-coke briquette combustion by ger stove, volatile matter content and dust emission are proportional (Fig. 1).

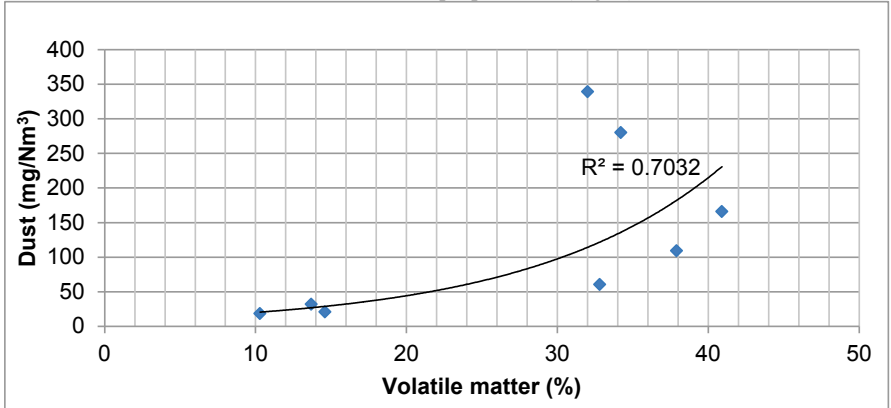


Fig. 1: Relation of Dust and Volatile Matter Content

- (2) Ash content of fuels and dust emission from stacks are not in correlative relation (Fig. 2).

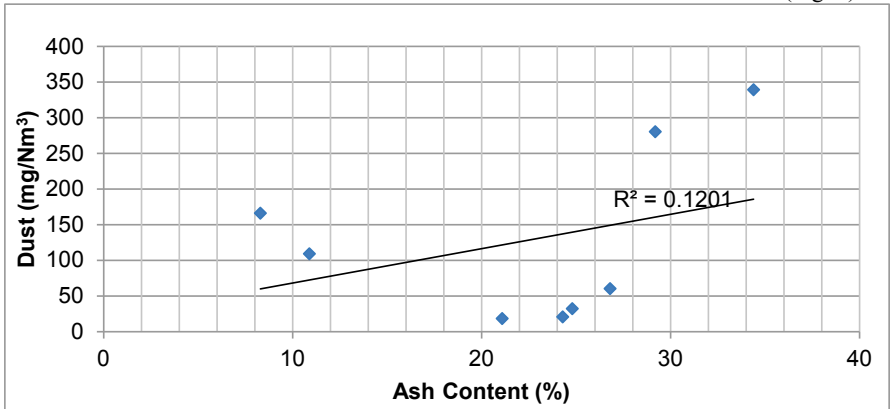


Fig. 2: Relations of Dust and Ash Content

- (3) It is not able to calculate dust emission in cold start appropriately because the dust emission by ignition materials is not constant. Therefore, hot start (measurement started after the fuel is ignited) is more applicable for fuel evaluation test.

(4) Based on lessons learned by the combustion test of this Project, a draft version of combustion test sequence was developed and proposed, which is to be used to develop a new combustion test methodology MNS (Fig. 3).

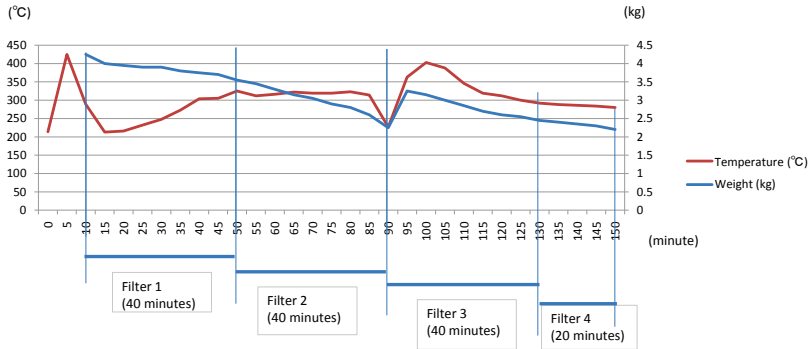


Fig. 3: Draft Version of Combustion Test Sequence

Activities from Now

To support the selection of the appropriate fuel and promotion of the use of the new coal fuel, the following Activities are planned in this project.

