

The Effect of Coke Breeze Addition of Coke strength

Je Young Kim

RIST.P.O.Box 135 Pohang 790-600,Korea

jkim@rist.re.kr

Introduction

The coke breeze during metallurgical coke production is the residue from screening or wet quenching at a mesh size of about 10mm and some parts are used for sintering plant. However, most of the breeze as received could not be used for coke making owing to the large particle size, which induced the fissure of coke^[1]. Then it piled up on the field as the waste. The amount of coke breeze is about 0.2% of the raw material.

To use coke breeze as the additive for coke plant, its grain has to be controlled suitable size. In this work, controlled size of coke breeze itself and briquette with organic binder added to the standard coal blend and determined the amount of coke breeze which can be used not to deteriorate the coke quality.

Experimental

The basic coal blend and its properties are shown as table 1.and table 2.

Table 1. Basic coal blend for experimental

blend	HM	LC	LL	GP	C2	MH	BD	HS	PC
Mixing ratio(wt%)	9	10	25	10	6	9	13	16	2

Table 2. Properties of coal blend

Properties	VM(%)	TD	LMF	CBI	RM(%)	Ash(%)
Value	25.42	99.0	2.85	1.80	1.04	10.53

The coke breeze was screened and used under 3mm size as additive.

As the additive to the coal blend, the screened coke breeze under 3mm itself, coke breeze crushed for several hours and briquetted with organic binder were used. For the coke preparation, the 250Kg test oven was used and the percentage of coke breeze addition was 1wt%, 2wt% and 4wt%.

The coking temperature and soaking time were 1000°C, 10hrs, respectively.

The prepared coke was quenched by dry conditions and measured the coke grain size and drum strength.

Results and Discussion

Particle size distribution of coke breeze as received is shown in Fig.1

About 45% of coke breeze passed the 1mm sieve and 70% passed the 3mm sieve.

Fig.2 shows the particle size distribution after crush by mill.

After crush, the particle mean diameter was about 0.08mm and most of the particles are

under 0.3mm.

Fig.3 shows the effect on coke grain size with the percentage of coke breeze. The grain size distribution with the coke breeze has shown the decrease of large size of coke.

It may be results of the deficiency of cohesion of the coal particles due to the coke breeze addition.

But, the addition of the briquette, which was mixed of coke breeze as, received and coal with using organic binders shows the increase of the medium size of coke. This result might be the supplement of cohesion properties of organic binders.

However, organic binders did not supplement the mechanical strength as shown in Fig. 5.

In Fig. 5, the addition of crushed coke breeze up to 1wt% maintain the drum index of basic blend coke quality, the coke prepared from the addition of coke breeze as received and briquette decreased the coke strength with the increase of coke breeze.

In Fig.4 the addition of coke breeze as briquette with basic coal blend showed the improvement of coke grain distribution, however, the addition of coke breeze as briquette with the mixture of coal and breeze and organic binder does not influence on the coke strength improvement even the charging density increased.

Conclusion

The most important factor was the particle size of coke breeze to use in coke making.

Coke breeze crushed as finely can be used as much as 1wt % without changing the coal blend ratio. For the much more use of coke breeze, the coal blend properties should be changed as like as higher fluidity and volatile matter.

Reference

[1] Loison R, Foch P. and Boyer A., Coke , Quality and Production, Butterworths,London. 1989;234-277

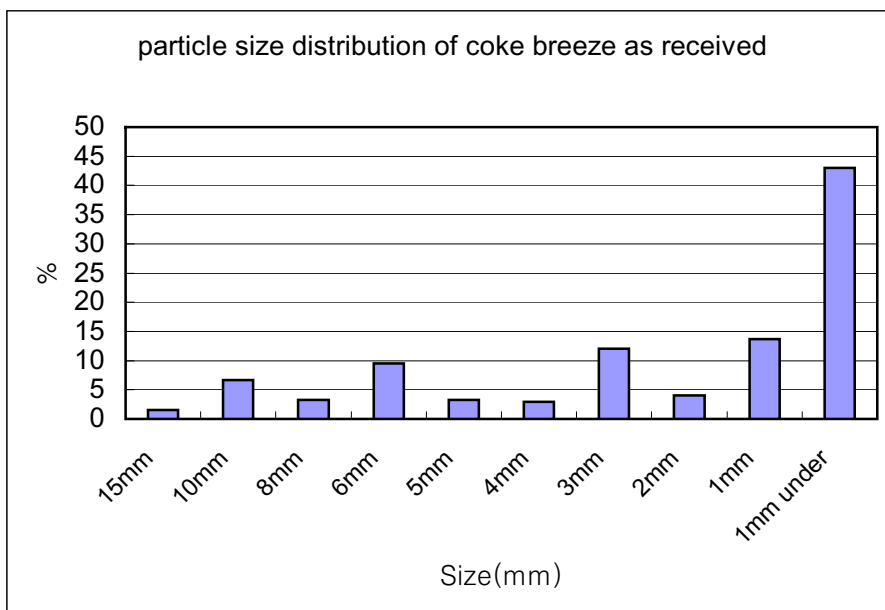


Fig.1 Coke grain size as received

oncentration: 0.0298 %Vol Vol. Weighted Mean D[4,3]: 72.087 um Specific Surface Area: 0.514258 m²/g
 pan (10% - 90%): 2.828 Uniformity: 0.869619 Surface Weighted Mean D[3,2]: 11.667 um
 result units: Volume
 d(0.1): 6.638 um d(0.5): 55.749 um d(0.9): 164.276 um

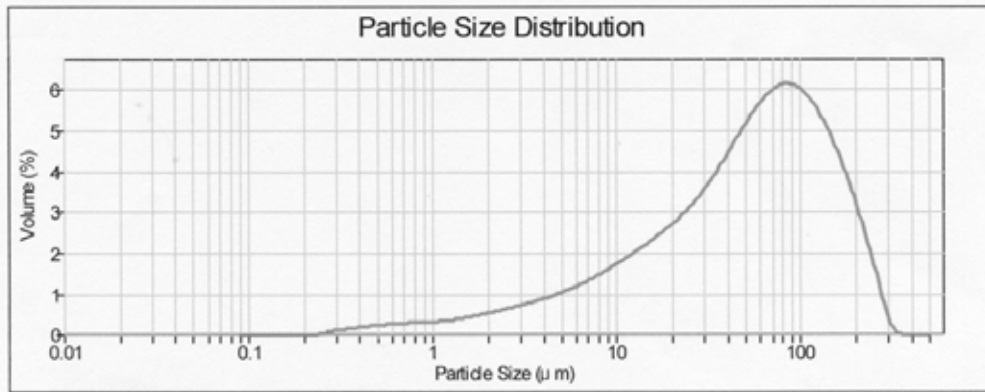


Fig.2. Particle size of coke breeze after crush

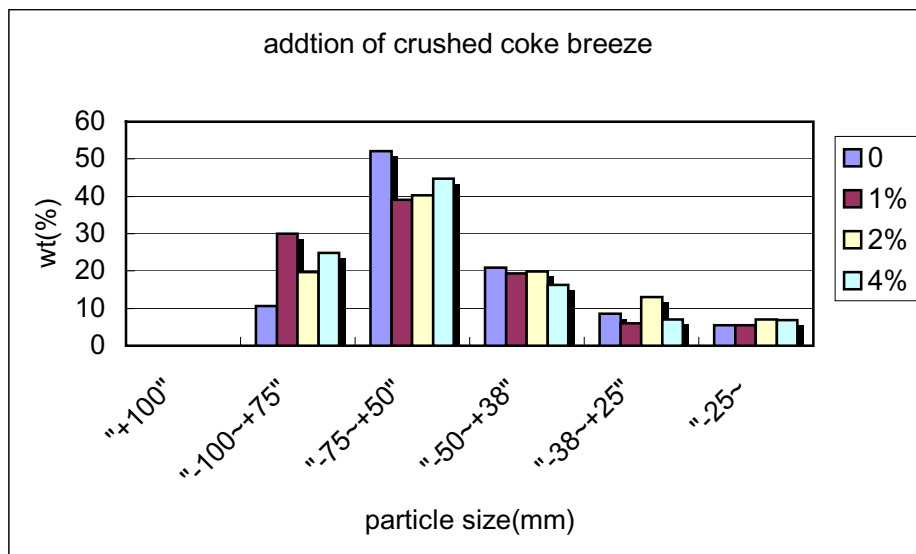


Fig.3 Particle size of coke from the addition of crushed coke breeze

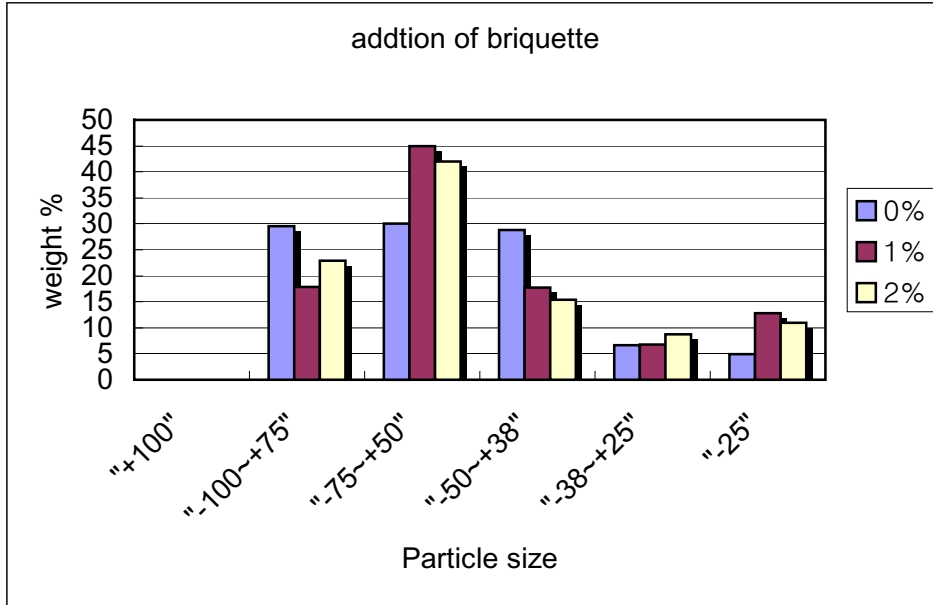


Fig.4 Particle size of coke with the addition of coke breeze as briquette

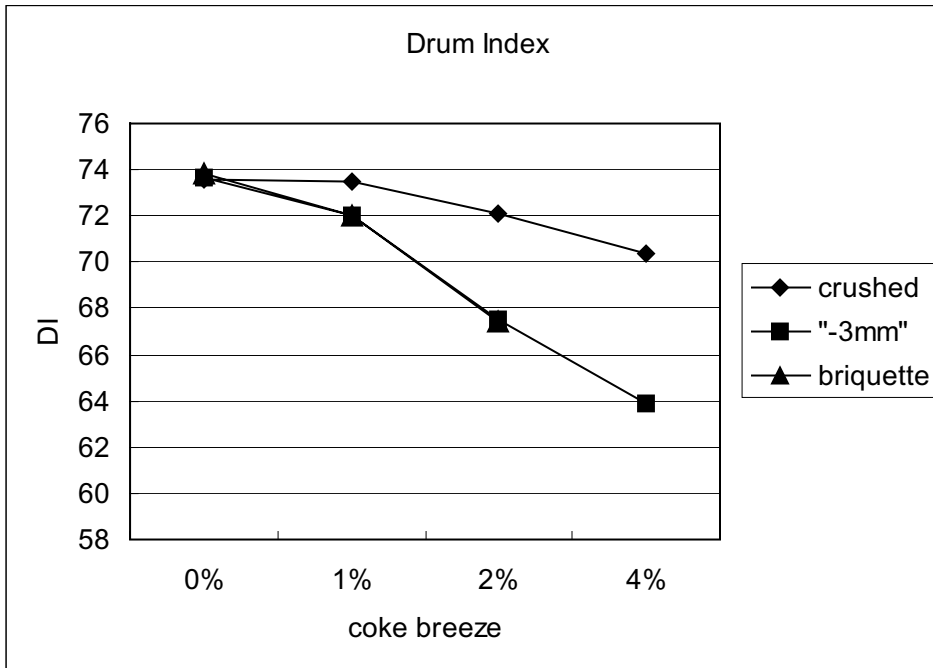


Fig.5 Drum index of coke prepared from coke breeze addition of various types