CRD-C 261-76

METHOD OF TEST TO DETERMINE WHETHER PORTLAND CEMENT IS CONTAMINATED WITH FLY ASH

1. Scope

1.1 This method covers a rapid qualitative method of test to determine whether a portland cement is contaminated with fly ash.

2. Apparatus

2.1 Beakers.- Two dry 150-ml (0.15 dm^3) beakers.

2.2 Dispensing graduate.- One 30-ml (0.03 dm^3) dispensing graduate.

3. Reagents

3.1 Acid.- Concentrated hydrochloric acid (HCl) as described in CRD-C 209.

3.2 Water.- Tap water.

4. Samples

4.1 This method is based on a visual examination of the residues after acid solution of a sample of portland cement that is assumed to be free of fly ash contamination and one that it is desired to evaluate. It is the responsibility of the person or agency desiring the test to employ procedures satisfactory to him (or it) to obtain the samples to be compared. The material presented for test shall consist of at least 5 grams of each of not fewer than two samples, one of which shall have been designated as the reference sample assumed to be uncontaminated.

5. Procedure

5.1 In beaker No. 1 put about 1 g of the reference cement. In beaker No. 2 put about 1 g of material for test. Add 20 ml of water to beaker No. 1 and swirl until cement is suspended. Continue swirling while adding 5 ml concentrated HCl (Note). Note that the cement will dissolve in a minute or less except for tiny whitish specks of silica. Treat beaker No. 2 similarly. If the cement is contaminated with fly ash a residue will remain undissolved and dark (Note). It will go to the center when beaker is swirled.

Note. - Slight warming helps dissolve the cement, but not the fly ash.

6. Discussion

6.1 In a 1-g sample of reference cement having an assumed insoluble residue = 0.5%, the insoluble residue after drying will weigh:

1 g x 0.5% = 1 g x 0.005 = 0.005 g = 5 mg

6.2 Assume cement like that in 6.1 above, but with a 5% contamination of fly ash.

6.2.1 Assume the fly ash has insoluble residue = 65%. In a 1-g sample of the mixture, the insoluble residue after drying will weigh:

1 g x 95% x 0.5% = 1 x 0.95 x 0.005 = 0.00475 g
1 g x 5% x 65% = 1 x 0.05 x 0.65 = 0.03250 g
                                            0.03725 g

0.03725 g = 37 mg

6.2.2 Alternately, assume the fly ash has insoluble residue = 80%. Now in a 1-g sample of the mixture, the insoluble residue after drying will weigh:

1 x 95% x 0.5% = 0.00475 g
1 x 5% x 80% = 0.04000 g
                    0.04475 g = 45 mg

6.3 Therefore at the 5% level of contamination, if the insoluble residue of the fly ash is 65%, the insoluble residue of the mixture will weigh 37/5 = 7.4 times as much as in the reference cement, while if the insoluble residue of the fly ash is 80%, the insoluble residue of the mixture will weigh 45/5 = 9 times as much as in the reference cement.

7. Report

7.1 The samples submitted for evaluation should be rated as "probably not contaminated" or "probably contaminated."