

Further Studies on Soluble Iron in Filter Aids

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ABSTRACT

Studies are reported on the correlation of phthalate-soluble iron with beer-soluble iron for calcined and flux-calcined diatomaceous earth (D.E.) filter aids. Each type of filter aid was found to produce a separate correlation curve. Flux-calcined D. E. exhibited a very good correlation. The correlation was very poor for calcined D.E., however.

Key words: Beer, Calcined, Flux-calcined, Phthalate-soluble iron

An ASBC Subcommittee on Soluble Iron in Filter Aids (2) has proposed that 1% aqueous potassium acid phthalate can serve as a standard extractant for determining soluble iron in filter aids. The recommendation was made that this method should be accepted for publication in the ASBC "Methods of Analysis." From collaborative studies done by the subcommittee, it was concluded that the relationship between phthalate-extracted iron and beer-extracted iron is linear. The method suggests that by plotting phthalate-soluble iron (PSI) values vs beer-soluble iron (BSI) values for any given beer, a specific, predictive curve with a good correlation coefficient could be established.

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TABLE I
Comparison of Beer-Soluble Iron to Phthalate-Soluble Iron
in Flux-Calcined Diatomite

Grefco Laboratory Identification No.	Beer-Soluble Iron (mg/kg)	Phthalate-Soluble Iron (mg/kg)
9425A	57	61
9425B	64	66
9425C	55	57
9445A	51	60
9445B	62	70
9445C	68	68
9445D	53	60
9445E	62	62
P823A	49	51
D95T	60	65
I99T	48	54
I916I	53	55
I923T	51	58
A990	34	42
A9300	37	40
T96T	36	39
T927A	56	59
O97S	34	38
O97E	33	37
O98I	35	39
O926M	46	50
O926U	41	46
M910	39	44
M91P	45	50
M980	64	67
M927S	38	43
M927E	40	42
M927L	42	50
S99H	41	44
S99L	42	45
A930I	33	39
A930A	32	38
A930T	35	36

TABLE II
Comparison of Beer-Soluble Iron to Phthalate-Soluble Iron
in Calcined Diatomite

Grefco Laboratory Identification No.	Beer-Soluble Iron (mg/kg)	Phthalate-Soluble Iron (mg/kg)
10749A	26	62
10749B	34	69
10749C	29	61
10749D	24	70
E81T	16	47
P817T	39	67
T913H	43	85
O912E	20	74
O914I	24	72
O914M	24	67
P83A	17	53
P830P	17	59
D919T	21	61
D926T	23	63
I99T	35	71
I914T	26	67
I923A	39	93
I924O	28	82
I924M	26	75
A92T	28	76
A923T	21	70
M980	36	76
M990	20	57
M99M	20	60

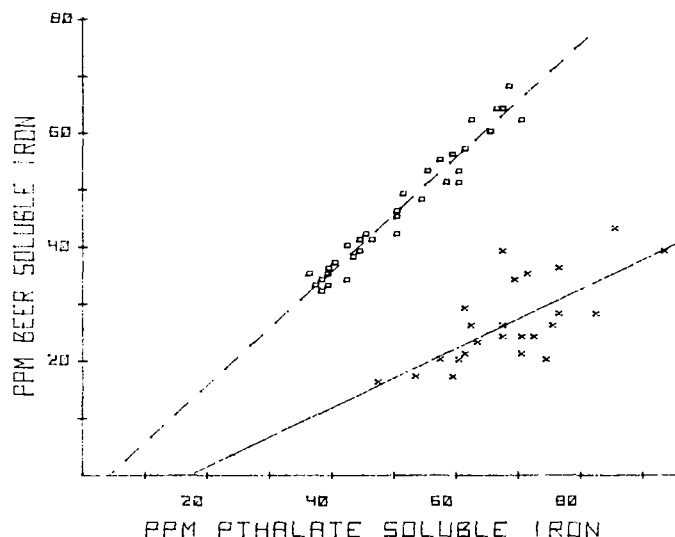


Fig. 1. Relation of phthalate-soluble iron (horizontal axis, mg/kg) to beer-soluble iron (vertical axis, mg/kg) for flux-calcined (\square) and for calcined (\times) diatomaceous earth filter aid.

At the Sales Service Laboratories of Dicalite/Grefco, Inc., immediate problems were encountered when attempts were made to correlate BSI results with PSI results on D.E. filter aids. It soon became apparent that very high PSI values could be obtained on calcined D.E. samples that showed moderately low BSI values.

To resolve this discrepancy, 33 flux-calcined and 24 calcined D.E. filter aids were examined for levels of PSI and BSI. The procedure of FILTER AIDS-4 (1) was followed, using degassed commercial beer and 1% aqueous potassium acid phthalate as extractants. Iron determinations were conducted according to the BEER-18,A method, using a Bausch and Lomb Spectronic 21 colorimeter.

The collected data are summarized in Tables I and II. The calculated correlation coefficient for the flux-calcined set of samples is 0.97 and the slope is 0.99. For the calcined materials, the calculated coefficient of correlation is 0.71, and the slope of the "line of best fit" is 0.52. This pronounced difference can be seen clearly in the graph of the data (Fig. 1).

As is apparent from Fig. 1, a separate correlation curve is necessary for each of the two types of filter aid investigated. This

could lead to some erroneous predicted BSI values, however. Furthermore, while the flux-calcined results display a very high degree of correlation, the correlation for calcined D.E. filter aids is so poor as to make the method impractical for this type of filter aid.²

²Independent results obtained by a major brewing laboratory, using numerous samples from more than one supplier, confirm that phthalate as a "standard" extraction for iron in filter aids has only limited application and that recommendation for general use appears to be invalid. (Personal communication, John H. Caul and Wayne D. Ruppel, G. Heileman Brewing Co., Inc.)

LITERATURE CITED

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