SHORTER COMMUNICATIONS

POSSIBLE LOSS OF SODIUM AND POTASSIUM DURING FUSION OF PLAGIOCLASE FELDSPARS[1]

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Introduction

A method for the identification of plagioclase feldspars, involving the formation of a glass and the determination of its refractive index, was described by Larsen (1909), but nothing has been written about the possibility of loss of sodium and potassium during the fusion. This investigation was made to test the reliability of the technique when samples are fused by an acetylene-air flame and in a high-temperature electric furnace.

Bowen (1913) used the method to facilitate his classic study of the plagioclase feldspars but further description of the technique was not forthcoming until Foster (1955) published his paper on the subject. The fusions have been made in open flames, in high-temperature electrical furnaces, and a few in a DC arc (Allard, 1957). According to Allard the alkali loss in the latter is small if the two elements are minor constituents of a siliceous sample. A curve published by Ahrens (1954) shows that the alkalis will volatilize in 50 seconds from diabase and in 150 seconds from microcline. Volatilization of alkalis thus is a potential source of error in glasses formed by the DC arc, and an unknown factor in glasses formed by other methods.

Technique

A specimen of albite from Villeneuve Township, Quebec, and one of Labradorite from Paul's Island, Newfoundland, were selected for study. The samples were crushed to 100 mesh and each was carefully mixed to ensure homogeneity. Duplicate determinations of Na_2O and K_2O were made on each by a flame photometric procedure.

The fusions were made on samples of 250 milligrams each, wrapped in platinum foil. Two samples of each plagioclase feldspar were suspended separately in a ceramic chimney and fused by means of an acetylene-air flame; one specimen of each feldspar was heated for 15 minutes, the

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second for 45 minutes, and at the end of each heating period the envelope was allowed to fall onto an asbestos sheet to cool. Two additional samples of each feldspar were placed in ceramic combustion boats lined with platinum foil and heated in a high-temperature electric furnace at 1450°C for the same periods of time as previously described. When cool, the platinum foil was wrapped around the fused sample.

The platinum envelopes were returned to the laboratory where the contents were analysed for the alkalis by flame photometer. The results are given in the accompanying table.

TABLE 1. THE SODIUM AND POTASSIUM CONTENT OF GLASSES FORMED BY THE FUSION OF ALBITE AND LABRADORITE

(Analyst: Serge Courville, Geological Survey of Canada)

Plagioclase	Fusion technique	Time (*minutes*)	Na_2O*	K_2O*
			%	%
Albite	unfused		10.47	0.38
			10.48	0.36
	air-acetylene	15	10.56	0.30
	air-acetylene	45	10.65	0.31
	electric furnace	15	10.43	0.30
	electric furnace	45	10.61	0.32
Labradorite	unfused		4.91	0.41
			4.91	0.41
	air-acetylene	15	4.87	0.44
	air-acetylene	45	4.88	0.44
	electric furnace	15	4.94	0.38
	electric furnace	45	4.90	0.40

*Total H_2O in albite is 0.20%, in labradorite 0.24%: the Na_2O and K_2O values for the unfused samples are given on a H_2O-free basis.

Conclusions

The investigations, described previously, show that there is no significant loss in either sodium or potassium under the conditions of the experiment and that the glasses formed by the fusion of the plagioclase powders under these conditions probably suffer no change in composition.

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A CANADIAN OCCURRENCE OF FAIRCHILDITE AND BUETSCHLIITE[1]

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Fairchildite ($K_2CO_3.CaCO_3$) and buetschliite ($3K_2CO_3.2CaCO_3.6H_2O$) have been identified from the trunk of a partially burned hickory tree near Deseronto, Ontario. The attention of the writers was drawn to this occurrence by officers of the Defence Research Board who submitted specimens to the Geological Survey of Canada for identification. Subsequently, one of us (K.R.D.) visited the occurrence and collected additional material from the top of the burned stump and from the ground beneath the fallen trunk.

The mottled grey and white stony material in the wood-ash is fine grained and has a fused appearance on the surface. It is readily soluble in dilute hydrochloric acid at room temperature. In thin section, the material consists of radiating aggregates of acicular mineral grains with scattered grains of charcoal and calcite. The acicular material was weathered to the extent that it was not possible to measure any of the optical properties of the minerals. Spectrographic analyses by W. F. White of the specimen indicate that magnesium and calcium are the major constituents with minor amounts of potassium and phosphorus.

Three distinct powder diffraction patterns were obtained from the samples submitted to the *x*-ray laboratory; two were identified as fairchildite and buetschliite with minor mutual contamination, and the third as calcite. The *x*-ray powder photographs were taken using a camera with diameter 57.54 mm., and nickel-filtered copper radiation. The observed intensities and measured *d*-spacings are presented in Table 1 together with the measurements for fairchildite and buetschliite of Milton & Axelrod (1947).

The close agreement between these two sets of patterns together with spectrographic analyses and the mode of occurrence confirms the identi-

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