

Results - Igneous Rx

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M-Mailer: Windows Eudora Version 1.4.4
ne-Version: 1.0
Date: Fri, 10 Feb 1995 13:27:22 -0500
To: ALICE@OCTOPUS.wr.usgs.gov
From: jgrossman@isdmdl.wr.usgs.gov (Jeffrey N. Grossman)
Subject: JOB WC70

I just reduced the INAA data for your seafloor basalts and andesites in job WC70. Some of the samples are loaded with Hg. I saw that you did the grinding yourself somewhere, and I wanted to alert you to possible contamination problems. One sample had ~30 ppm Hg! Here's a table:

BART-5b	3.5 ppm
KSB-21A	27 ppm
KSB-21B	7 ppm
T-219	6 ppm
All others	< 0.5 ppm

Of course, maybe it's really in the rocks, but that would be extraordinary.

I'm telling you this by e-mail because Hg contamination can be a health hazard if it's in one of your labs.

ff Grossman
03) 648-6184

p.s. Let me know if you want your data by e-mail too.

T5 or
for PTS

Blanco Fracture Zone Samples

A 87

3R*-diabase †
 4R*-diabase †
 5R-basalt †
 6R*-diabase †
 7R-brecciated diabase
 8R-diabase
 9R-diabase
 10R-basalt
 11R-diabase
 12R*-diabase †
 13R-diabase
 14R*-diabase †
 15R*-diabase †
 16R-diabase/basalt breccia
 17R*-basalt †
 19R-diabase
 20R1*-diabase
 20R2*-diabase †
 21R-diabase
 22R-diabase

A 88

1R*-porphyritic basalt
 2R*-porphyritic basalt †
 3R*-porphyritic basalt
 4R*-porphyritic basalt †
 5R*-porphyritic basalt
 6R1-porphyritic basalt
 6R2*-porphyritic basalt †

A 89

1R-porphyritic basalt
 2R-porphyritic basalt
 5R*-porphyritic basalt †
 6R*-porphyritic basalt †
 7R*-basalt breccia
 8R*-recrystallized mylonite †

*Polished sections

A 90

4R-heterolithic breccia
 5R1*-brecciated diabase
 5R2*-basalt †
 6R-heterolithic breccia
 8R-brecciated gabbro
 9R-brecciated gabbro
 10R*-diabase †
 11R-mag.? basalt
 12R-mudstone
 13R-volcanic arenite
 15R*-porphyritic basalt †
 16R- conglomerate?
 17R-glassy basalt breccia †
 18R-porphyritic basalt
 19R-volcanic arenite
 20R*-glassy basalt breccia

A 91

5R*-porphyritic basalt †
 13R1*-porphyritic basalt †

T783

1R-brecciated diabase
 2R1*-diabase †

T784

1R-brecciated gabbro
 2R-cumulate? gabbro
 3R*-gabbro †
 04-brecciated cumulate gabbro
 R6*-gabbro †
 RB7*-porphyritic basalt †

† = Chem (Majors, EDXRF, ILLIAA Long count).

A87-3R

Primary lithology-sparsely porphyritic, intergranular to slightly subophitic diabase

Secondary lithology-partially altered diabase

Phenocrysts

Plagioclase-up to ~2 mm long, partially replaced along margins and fractures by chlorite and other unidentifiable material.

Groundmass

Plagioclase-lath-like, typically ~0.3 to 1 mm long, largest ~2.3 mm. Most is fresh, but some partial clouding by fine-grained material. Also some partial replacement by patchy chlorite and fibrous amphibole. A trace of replacement by (?) [colorless, 1st order pale yellow].

Clinopyroxene-equant intergranular to larger (~0.76 mm) subophitic grains. Most is fresh, but partial replacement by patchy aggregates of chlorite and fibrous amphibole.

Fe-oxide-generally 0.03 to 0.1 mm, equant. Largest ~0.57 mm.

Intersertal areas-scattered, angular pockets containing semi-opaque, brown material and some fine-grained opaques. Some of the larger Fe-oxide grains tend to be concentrated in these areas. Probably relict, primary intersertal texture.

Secondary material-patchy aggregates which replace pyroxene and some plagioclase. Composed predominantly of:

- 1) fibrous amphibole - irregular to acicular, pale yellowish to green, brownish in thicker grains. Generally parallel aggregates.
- 1) chlorite - green, very low to zero birefringence.

A87-4R

Primary lithology-sparsely porphyritic, intersertal diabase

Secondary lithology-partially altered diabase

Phenocrysts

Plagioclase-up to ~1.7 mm, partially replaced by irregular, patchy network of (albite?) [colorless, 1st order gray], which contains fine-grained brown material.

Groundmass

Plagioclase-lath-like, longest ~1.3 mm, some partial replacement along fractures, cores or cleavage by greenish "chlorite" or other material.

Clinopyroxene-intergranular to irregular, slightly subophitic. Some crudely radiating intergrowths of plagioclase and pyroxene.

Fe-oxide-equant grains generally 0.03 to 0.06 mm. Nearly all is concentrated within intersertal areas.

Intersertal areas-very well developed. Scattered pockets of semi-opaque, brownish material and elongate opaques. Probably relict, primary intersertal texture.

Secondary material-occupies dispersed patchy areas. Composed of:

- 1) amphibole-pale yellow to green, fibrous to ragged and "solid" grains

- 2) chlorite-green, yellowish birefringence
- 3) [small, irregular, brownish grains]. This material occurs with chlorite and amphibole in many samples.
- 4) carbonate-trace

Vein-very narrow and discontinuous, contains fibrous amphibole.

A87-5R

Primary lithology-sparsely porphyritic, intersertal basalt

Secondary lithology-slightly altered and veined basalt

Phenocrysts

Plagioclase-minor, ~0.04 to 1.3 mm, partially to completely replaced by analcite?[colorless, nearly isotropic] and chlorite.

Groundmass

Plagioclase-mostly fresh, lath-like, typically ~0.1 to 0.4 mm long. Partial replacement along fractures and cores of grains.

Clinopyroxene-intergranular form, all appears fresh.

Fe-oxide-equant, generally ~0.03 mm. Largest ~0.1 to 0.2 mm, irregular.

Interstitial material-pockets of chlorite [pale green, gray to anomalous blue] and fibrous amphibole scattered throughout groundmass.

Veins-up to ~2.6 mm wide to narrow, irregular branching veinlets dominated by analcite [colorless, isotropic to gray bf., generally equant form; confirmed by x-ray]. Analcite is both clear and filled with inclusions and voids. Subhedral grains border a vug within largest vein. Analcite also contains prismatic to columnar [colorless, parallel ext., up to 1st order yellow].

A87-6R

Primary lithology-sparsely porphyritic pyroxene diabase?

Secondary lithology-veined pyroxene-amphibole diabase

Phenocrysts

Plagioclase-sparse. Largest ~2.3 mm across, composite structure, ragged and partially replaced by amphibole; partially encloses a pyroxene grain. Another pheno. mostly replaced by analcite?

Groundmass

Plagioclase-lath-like, up to ~2.4 mm, typically ~0.4 to 0.7 mm. Laths in various states of replacement by amphibole; typically embayed and truncated.

Remaining plagioclase is partially clouded and replaced along fractures by greenish amphibole (+chlorite?) or other unidentifiable material.

Clinopyroxene-irregular, ragged grains variably replaced by amphibole. Pyroxene is commonly preserved in plagioclase-pyroxene intergrowths.

Amphibole-irregular prismatic to multigranular aggregates, greenish to brownish, fibrous texture. Contains variable amount of fine-grained opaque inclusions.

Fe-oxide-generally 0.06 to 0.15 mm, typically equant, angular grains.

Veins-Two main types

- 1) Contains one or more of the following
 - A) analcite
 - B) [prismatic, columnar to equant; colorless; up to 1st order red-blue; parallel ext.]
 - C) carbonate-minor

Up to ~0.6 mm wide; rectilinear pattern. Variable replacement of plagioclase by analcite and (B) out to ~1 mm from vein.

- 2) Contains greenish, fine-grained amphibole. Narrow and irregular, generally ~0.07 mm wide. Oriented at high angle to trends of type 1 veins. Coarser amphibole cuts the vein in several places, but merges with fine-grained amphibole elsewhere. No clear cross-cutting relationship to type 1 veins visible.

A87-7R

Primary lithology-intersertal to intergranular diabase

Secondary lithology-highly altered, veined and brecciated diabase

Angular clasts of diabase (up to >19 mm) in a fine-grained matrix. Angular epidote fragments in the matrix suggest an episode of alteration and veining prior to brecciation.

Clasts

Plagioclase-lath-like, typically ~0.1 to 0.4 mm. Some crudely radiating plagioclase-pyroxene intergrowths. All plagioclase is highly clouded and replaced by analcite, chlorite and [1st order gray-white]. In some clasts, the original lath form is almost obliterated.

Clinopyroxene-generally equant and intergranular. Partially replaced by pale brownish amphibole.

Amphibole-two main varieties:

- 1) a pale brownish type partially replacing clinopyroxene and
- 2) aggregates of pale green, prismatic to fibrous grains, together with chlorite, as a patchy replacement of both plagioclase and clinopyroxene.

Fe-oxide-equant to irregular, ~0.04 to 0.2 mm. The larger grains tend to be located in intersertal areas.

Intersertal areas-patchy, angular areas containing brownish material. Relict primary intersertal texture.

Matrix-Contains small diabase fragments, pyroxene grains, altered plagioclase and abundant fine-grained brownish material with low birefringence, probably analcite. The matrix also contains angular to rounded, multigranular fragments of pale yellowish-green epidote and possible fragments of an epidote-chlorite vein. Very fine-grained [colorless, 1st order yellow] dispersed in patches in the matrix and lines some tiny vugs.

Veins-along edge of slide, at least 0.7 mm wide. Composed of analcite and minor carbonate?. Colloform analcite? lines the margins of some partially open, irregular veinlets cutting the matrix.

A87-8R

Primary lithology-sparsely porphyritic, intersertal to slightly subophitic diabase

Secondary lithology-veined and altered diabase

Phenocrysts

Plagioclase-blocky; ~1.3 mm long; clouded by unidentified, fine-grained material and partially replaced by analcite.

Groundmass

Plagioclase-lath-like, generally ~0.03 to 0.04 mm. Minor amount may be fresh, but most is highly clouded by fine-grained material and/or replaced by

- 1) multi-granular aggregates of [colorless, 1st order pale yellow], albite twinning destroyed.
- 2) analcite
- 3) chlorite

Clinopyroxene-equant intergranular to subophitic; largest ~0.7 mm. Most is fresh, but some partial replacement by chlorite.

Fe-oxide-typically 0.03 to 0.1 mm; largest up to ~0.5 mm, irregular. Most are concentrated in intersertal areas.

Intersertal areas-patchy areas of dark, fine-grained material-a relict primary feature.

Secondary products-(outside of plagioclase), occur in sharply bordered patches that replace both plagioclase and pyroxene. Consist of

- 1) chlorite-[green to yellowish, 1st order grays to white], the dominant secondary product.
- 2) fibrous amphibole-acicular and parallel prismatic aggregates, minor amount.
- 3) [small, irregular brownish grains], as in other samples.

Veins-irregular, branching network containing angular diabase fragments; cut across the secondary patches above. Vein minerals consist of

- 1) analcite-dominant mineral-clear to containing abundant inclusions and voids.

- 2) [colorless to containing brownish streaks, prismatic, 1st order yellow, parallel ext.]. Occur in radiating aggregates up to 2.9 mm across. Minor amount.

A87-9R

Primary lithology-intersertal to slightly subophitic diabase

Secondary lithology-partially altered and veined diabase

Plagioclase-lath-like, typically ~0.2 to 0.6 mm long. Some is clear, but most is clouded by variable amounts of fine-grained unidentified material.
Replacement along fractures by "chlorite."

Clinopyroxene-equant intergranular to subophitic, up to ~0.9 mm. Most is fresh, but some partial replacement by chlorite.

Fe-oxide-typically equant and ~0.04 to 0.1 mm. Minor larger, irregular grains up to ~0.4 mm.

Secondary products-irregular, patchy areas up to ~0.7 mm which appear to be replaced plagioclase and pyroxene. Some areas have a circular form-

"chlorite spots" -which occur in other samples also. Secondary products consist of

- 1) chlorite-dominant, yellowish to green, anomalous blue to slightly yellowish bf.
- 2) fibrous amphibole-very minor.
- 3) [small, irregular, brownish grains], as in other samples.

Veins-generally irregular and sharply bounded. Contain:

- 1) thomsonite-[colorless, columnar or prismatic, up to 1st order red-blue bf., parallel ext.]. X-ray diffraction identification also.
- 2) lesser carbonate
- 3) chlorite- minor, lines the outer margin of some veins.

A87-10R

Primary lithology-sparsely porphyritic, intersertal basalt

Secondary lithology-slightly altered basalt

Phenocrysts

Plagioclase-one, ~1.4 mm, partially replaced by carbonate.

Groundmass

Plagioclase-narrow microlites up to ~1.2 mm. Mostly fresh, but some clouding by unidentified material.

Clinopyroxene-mostly in the form of parallel, prismatic aggregates.

Fe-oxide-generally ~0.03 to 0.07 mm.

Intersertal material-pale yellowish to green "chlorite" [grayish to yellow bf.] pervades all intersertal spaces. Also contains abundant [small, irregular, brownish grains], as in other samples.

Veinlets-a couple narrow, irregular "chlorite" veinlets.

A87-11R

Primary lithology-sparsely porphyritic pyroxene diabase

Secondary lithology-partially altered and veined pyroxene-amphibole diabase

Phenocrysts

Plagioclase-~2.5 mm long, clouded and partially replaced by analcite, which merges with a vein.

Groundmass

Plagioclase-lath-like, typically 0.3 to ~0.7 mm, some crudely radiating plagioclase-pyroxene intergrowths. Varies from clear to variably altered:

- 1) clouded with fine-grained, unidentified material
- 2) partial to complete replacement by analcite
- 3) partial replacement by amphibole

Clinopyroxene-some remains fresh, but most is partially to completely replaced by what appears to be brownish to greenish brown amphibole.

Fe-oxide-generally angular, typically 0.03 to 0.1 mm

Other secondary products-patchy areas which have replaced plagioclase and pyroxene. Consisting entirely? of randomly-oriented aggregates of

green to brownish to blue green fibrous amphibole. Generally lighter in color than the amphibole obviously replacing pyroxene.

Veins-irregular, sharply-bounded, up to ~0.4 mm wide. Contain almost exclusively analcite [colorless, isotropic to gray bf.], x-ray identification also. One narrow, irregular amphibole veinlet.

A87-12R

Primary lithology-subophitic pyroxene (-amphibole?) diabase

Secondary lithology-slightly altered and veined pyroxene-amphibole diabase

Plagioclase-lath-like, typically ~0.3 to 1.3 mm, longest ~3.3 mm. Most is fresh, but some partial clouding by unidentified, fine-grained material. Partial replacement along fractures, cleavage and in patches by greenish amphibole. Plagioclase is ragged and partially replaced adjacent to amphibole-chlorite patches.

Clinopyroxene-subophitic, up to ~1.7 mm. Much remains fresh, but there is variable replacement by amphibole. Pyroxene is in part very ragged and forms cores within coarse amphibole.

Amphibole-ranges from coarse subophitic (up to ~1.8 mm) to fine-grained, fibrous aggregates. Pale yellow to brownish to blue-green. Grains typically have a striated texture due to oriented inclusions or color variations and contain fine-grained opaque inclusions.

Fe-oxide-generally equant and ~0.05 to 0.15 mm.

Chlorite-mixed with fibrous amphibole; green, some anomalous blue bf.

Veins-narrow and irregular; two generations:

- 1) First generation-up to ~0.8 mm wide. Contains: [colorless, 1st order grays], chlorite, fibrous amphibole, opaques and traces of epidote.
- 2) Second generation-thomsonite?[colorless, 1st order pale yellow, parallel ext.]. These veins are at a high angle to the first generation vein.

A87-13R

Primary lithology-intergranular or intersertal diabase

Secondary lithology-highly altered and veined diabase

Plagioclase-lath-like, typically ~0.1 to 0.6 mm. All is clouded to variable degrees by unidentified, fine-grained material. Some is replaced by analcite.

Clinopyroxene-intergranular to pyroxene-plagioclase intergrowths. Partially replaced by yellowish-greenish fibrous amphibole.

Secondary products-patchy areas of fibrous amphibole and chlorite [pale yellowish to green, nil to anomalous blue bf.].

Fe-oxide-typically ~0.3 mm wide and equant, uniformly distributed.

Veins-two generations with clear crosscutting relationships:

- 1) First generation-up to ~0.34 mm wide, composed of fine-grained, felty yellowish to blue-green, fibrous amphibole.

2) Second generation-more voluminous and irregular network. Contains analcite and lesser carbonate. Analcite contains abundant inclusions and voids. Another vein contains mostly [colorless, columnar, 1st order white, parallel ext.] and minor analcite; cuts a first generation vein.

A87-14R

Primary lithology-sparsely porphyritic, intergranular to subophitic diabase

Secondary lithology-slightly altered and veined diabase

Phenocrysts

Plagioclase-up to ~2.9 mm long, mostly replaced by analcite. Rims of plagioclase preserved on some grains.

Groundmass

Plagioclase-lath-like, generally ~0.2 to ~0.8 mm long. Variable clouding by unidentified fine-grained material. Some partial replacement by chlorite and analcite.

Clinopyroxene-mostly very fresh; intergranular to subophitic (up to ~0.7 mm) and crudely radiating intergrowths of plagioclase and pyroxene.

Fe-oxide-generally ~0.06 to 0.15 mm, angular and equant, largest up to ~0.5 mm. Tendency to concentrate within intersertal areas.

Intersertal areas-patchy areas containing darker material and fine-grained opaques-a relict primary feature.

Secondary products-patchy areas containing:

- 1) chlorite-most abundant, pale yellow to green [nil to anomalous blue bf].
- 2) fibrous amphibole- minor, brownish to green.

Veins-up to ~0.2 mm wide, sharp borders. Containing:

- 1) analcite-dominant
- 2) [colorless, 1st order orange, inclined? ext.]

A87-15R

Primary lithology-sparsely porphyritic, intersertal to subophitic diabase

Secondary lithology-slightly altered and veined diabase

Phenocrysts

Plagioclase-sparse, up to ~3.2 mm long, partially replaced by chlorite and analcite.

Groundmass

Plagioclase-generally stout laths (0.3 to 1.1 mm) and plagioclase-pyroxene intergrowths. Some clouding by fine-grained material and partial replacement along fractures by chlorite. Also partial replacement by coarser secondary material (see below).

Clinopyroxene-generally very fresh; intergranular to subophitic; also crudely radiating plagioclase-pyroxene intergrowths.

Fe-oxide-tendency to concentrate within intersertal areas.

Intersertal areas-irregular areas containing darker, fine-grained material, slender, fine-grained opaques and reddish brown altered? grains. Relict primary intersertal texture.

Secondary products-irregular to circular areas ("chlorite spots," up to ~0.5 mm). Replaces plagioclase and pyroxene in discrete, sharply bounded areas. Contain:

- 1) chlorite-dominant, strong pleochroism (pale yellowish to green, yellowish bf.)
- 2) fibrous amphibole-traces
- 3) [small, irregular, brownish grains] as in other samples.

Veins-two varieties:

- 1) narrow, sharply bordered, containing thomsonite?[colorless, 1st order blue bf., parallel ext.]. Cuts through patches of secondary products.
- 2) contains a core of thomsonite?, bordered by fine-grained, greenish chlorite (and amphibole?).

The two veins intersect, but any cross-cutting relationship is not clear.

A 87-16R

Primary lithology-heterolithic breccia

Secondary lithology-altered and veined breccia

Clasts

Angular to rounded fragments (up to ~12 mm) of:

- 1) highly altered amphibole diabase (most abundant) and pyroxene-amphibole diabase
- 2) very fine-grained basalt
- 3) intergranular basalt

Matrix-constituents generally <0.1 mm, composed of:

- 1) smaller rock fragments
- 2) pyroxene, amphibole and chlorite grains
- 3) fine-grained, unidentified brownish material [isotropic or very low bf.]
- 4) veinlets of opal [colorless, isotropic, colloform structure]. A rind of vuggy opal partially surrounds some clasts.

A 87-17R

Primary lithology-sparsely porphyritic, intersertal or intergranular basalt

Secondary lithology-partially altered basalt

Phenocrysts

Plagioclase-glomerocrysts up to ~1.7 mm. Partially clouded with fine-grained, unidentified material and partially replaced by chlorite.

Opaques-scattered, irregular grains up to ~1.25 mm; enclose plagioclase and pyroxene. Secondary sulfides?

Groundmass

Plagioclase-lath-like, typically 0.1 to ~0.4 mm long. Some partial clouding or replacement by chlorite.

Clinopyroxene-generally equant, 0.04 to 0.1 mm.

Fe-oxide-very fine-grained, relatively minor component.

Secondary products-pale yellow to green chlorite pervades all intersertal spaces and replaces some pyroxene and plagioclase. [small, irregular, brownish grains], similar to that in other samples, occurs with other secondary products.

A 87-19R

Primary lithology-pyroxene diabase

Secondary lithology-amphibole-pyroxene diabase

Plagioclase-stout lath-like, typically ~0.4 to 2.0 mm-one of the coarsest diabases in the A87 group. Variable degrees of clouding by unidentified, fine-grained material, replacement along fractures by amphibole and chlorite and more extensive replacement by amphibole.

Clinopyroxene-anhedronal, in various states of replacement by amphibole. Pyroxene typically preserved within plagioclase-pyroxene intergrowths.

Amphibole-complete gradation from coarse, subophitic grains (up to ~2.3 mm) to aggregates of finer-grained fibrous amphibole. Pale yellowish to greenish brown to blue-green. Commonly mottled due to color variations. Grains commonly have a striated texture due to oriented inclusions or fibrous structure and contain fine-grained opaque inclusions.

Fe-oxide-equant to irregular, typically ~0.04 to 0.3 mm.

Chlorite-much subordinate in volume to amphibole. Pale yellowish to green, anomalous blue bf. Patches within amphibole or replaces pyroxene.

A 87-20R1

Primary lithology-sparsely porphyritic, intergranular diabase

Secondary lithology-altered and veined diabase

Phenocrysts

Plagioclase-blocky to lath-like, ~0.34 to 1.2 mm. Partially clouded by fine-grained, unidentified material; and partial replacement by "chlorite," [colorless, 1st order yellow] and analcite.

Groundmass

Plagioclase-stout lath-like form, generally 0.1 to 0.6 mm. Clouded to variable degrees by fine-grained material; patchy replacement by chlorite and analcite.

Clinopyroxene-mostly replaced by amphibole. Very similar to the style of replacement in A87-21R and A87-22R.

Fe-oxide-typically ~0.03 to 0.06 mm and equant.

Amphibole-two types:

- 1) dark brownish-green grains replacing pyroxene.
- 2) patchy aggregates of yellowish to green fibrous amphibole.

Chlorite-yellowish to green with anomalous blue bf.. Occurs with fibrous amphibole.

Veins-two generations with clear cross-cutting relationship

- 1) first generation-very narrow (~0.1 mm) and linear; containing greenish fibrous amphibole.
- 2) second generation-larger (0.03 to 1.1 mm) and irregular network containing analcite and [colorless, prismatic, 1st order yellow, parallel ext.] dispersed within analcite.

A 87-20R2

Primary lithology-sparsely porphyritic, intersertal to ophitic diabase

Secondary lithology-partially altered and veined diabase

Phenocrysts

Plagioclase-a couple, up to ~1.9 mm. Partially replaced by chlorite, analcite? and other unidentified material.

Groundmass

Plagioclase-lath-like, typically ~0.2 to 0.8 mm. Variable degrees of clouding by fine-grained, unidentified material; partial replacement by chlorite, analcite and (near a vein) fine-grained aggregates of [colorless, 1st order yellow].

Clinopyroxene-subophitic to ophitic grains up to ~2.6 mm. Very little alteration or replacement.

Fe-oxide-typically ~0.06 to 0.1 mm, largest ~0.33 mm. Mostly confined to intersertal areas.

Intersertal areas-irregular areas containing unidentified brown material, fine-grained opaques and patchy chlorite. Relict primary texture.

Chlorite-pale yellowish to green, anomalous blue bf.. Patchy replacement of plagioclase and pyroxene. Contains [small, irregular, brownish grains], which resembles the brown material in intersertal areas.

Veins-Appears to be two generations:

- 1) first generation-narrow and irregular with sharp borders. Contains only analcite.
- 2) second generation-also narrow and sharp-bordered. Contains:
 - A) [colorless, 1st order white bf.], grains cut across the first generation material.
 - B) analcite?
 - C) [colorless, prismatic, 1st order red, parallel ext.].

A 87-21R

Primary lithology-sparsely porphyritic intergranular diabase

Secondary lithology-slightly altered diabase

Phenocrysts

Plagioclase-largest ~0.6 mm; highly clouded by unidentified fine-grained material, analcite? and chlorite.

Groundmass

Plagioclase-stubby, lath-like form, generally ~0.07 to 0.4 mm. Some plagioclase-pyroxene intergrowths. Variable clouding.

Clinopyroxene-mostly intergranular, partial replacement by brown material (amphibole?), which can have distinct extinction, but rarely pleochroism. Similar to the replacement style in A87-20R1 and A87-21R.

Fe-oxide-typically ~0.04 to 0.08, angular, equant; largest ~0.2 mm.

Secondary material-irregular to round areas ("chlorite spots") containing pale yellow to green chlorite (yellowish to anomalous blue bf.). Chlorite replaces some pyroxene and plagioclase. [small, irregular, brownish grains] occur with chlorite; appears similar to the brown material replacing pyroxene.

Veins-contain two components:

- 1) a discontinuous border of parallel to radiating amphibole? [brownish yellow to greenish].
- 2) a discontinuous core of analcite.

A87-22R

Primary lithology-sparsely porphyritic, intersertal to subophitic diabase

Secondary lithology-partially altered and veined diabase

Phenocrysts

Plagioclase-up to ~1.7 mm. Partial replacement by analcite(?), amphibole and [colorless, 1st order red-blue bf.]

Groundmass

Plagioclase-lath-like, typically ~0.3 to 1.1 mm, largest ~2.4 mm. All is partially to highly clouded by unidentified, fine-grained material. Partial replacement along fractures by chlorite, amphibole or analcite(?). Plagioclase adjacent to a vein is largely replaced by analcite(?).

Clinopyroxene-generally subophitic, largest grains up to ~0.7 mm. Minor partial replacement by amphibole(?).

Amphibole-possibly two varieties:

- 1) brownish to greenish material replacing pyroxene. Some is pleochroic, but rarely has distinct cleavage or form. Very similar to the style of replacement in A87-20R1 and A87-21R.
- 2) acicular, yellowish to green fibrous amphibole occurs within patchy chlorite.

Fe-oxide-typically ~0.06 to 0.15 mm, largely confined to intersertal areas.

Intersertal areas-patchy, slightly darker areas containing fine-grained opaques, some finer-grained plagioclase, fibrous amphibole, chlorite and the coarser Fe-oxide. Appears to be relict primary texture, but is less distinct than that in other samples.

Chlorite-patchy areas of yellowish to green chlorite (anomalous blue bf.) together with fibrous amphibole. Replaces pyroxene and plagioclase.

Veins-up to ~1.1 mm wide. Dominant mineral is analcite, with lesser [colorless, prismatic, parallel ext., 1st order yellow]. Some plagioclase up to ~4 mm from vein is highly clouded and mostly replaced by analcite. Veins cut across chlorite alteration patches.