AM-86-296

Mineralogy and paragenesis of "pocket" clays, and associated minerals in complex granitic pegmatites, San Diego County, California

Foord, et al.

To be deposited: Table 1

american Mineralogist, 71 3-4, 428-439

Table 1. Samples of 'pocket' clays and other minerals examined from the Himalaya and San Diego mines (39 samples), Mesa Grande District; the Little Three Mine (4 samples) Ramona District; the Ocean View, Katrina, White Queen, and Tourmaline Queen mines (9 samples), Pala District; and the Maple Lode mine (1 sample), Aguanga Mountain.

Sample number	Location and description	Minerals identified and amounts present (all amounts given as parts in 10)	
	San Diego Tourmaline Mine, Mesa Grande District		
SDTM-0*	Waxy, overall light pink clay. Some minor brown-black manganese oxides. About 2% of clay is vivid pink-red, and waxy. Also traces of white clay. 1-2% laumontite present in cavities. Pocket-filling.	quartz mica cookeite montmorillonite or beidellite Li-tosudite	trace <1 <1 trace 8+
SDTM-1	White, granular, friable pollucite with some white clay. Veinlets of cross-cutting quartz. Pocket-filling.	illite montmorillonite pollucite	trace trace 9+
SDTM-2	Crystalline, white laumontite, to 4 mm in length. Cross-cut by a network of lepidolite. Fine-grained, buff clay fills interstices. Pocket-filling.	montmorillonite laumontite	1 9
SDTM-3	Fine-grained, white to light pink clay. Traces of relict, granular, clear pollucite. Pocket-filling.	montmorillonite pollucite	9+ trace
SDTM-4	Massive, radiating aggregates of white stilbite coated with pale pink montmorillonite; pocket-filling.	stilbite montmorillonite	9+ <1
SDTM-5*	Nearly identical in appearance to SDTM-0.	illite cookeite montmorillonite Li-tosudite	1 trace trace? 8+
SDTM-2EV	Pale-pink, pocket-filling clay.	quartz K-feldspar laumontite montmorillonite+	trace 2+ trace 7

SDTM-2EJ	Pink and white pocket-filling clay. Contains fragments of tourmaline, mica, quartz, etc. White and pink clays about 50% each.	pink clay	
		K-feldspar	1+
		laumontite	1+
		mica	trace
		montmorillonite+	7
		white clay	
		K-feldspar	trace
		heulandite	5
		laumontite	3
		montmorillonite+	1
		mica	<1
SDTM-3a	Mixture of white clay and red-brown, sticky clay; pocket-filling.	quartz	<1
		albite	trace
		mica	trace
		kaolinite	4+
		montmorillonite	4+
SDTM-4c	Dark brown, waxy clay; pellets and masses; pocket-filling.	mixed-layer illite-smectite (40-60% expansible layers, (probably nontronite)	9+
		mixed-layer illite-vermiculite	<1
SDTM-5	White pocket-filling, containing fragmented primary pocket minerals such as quartz, elbaite, feldspar, and others.	quartz	2+
		K-feldspar	<1
		illite	trace
		montmorillonite	6+
SDTM-5E	Pseudomorph of white alteration minerals after beryl. Assoc. albite.	quartz	trace
		albite	2
		beryl (var. morganite)	1+
		bavenite	2+
		montmorillonite	3+
SDTM-6E	White, fibrous 'mountain-leather' with coatings of later red-brown (Fe-stained) kaolinite. Pocket-filling.	quartz	<1
		K-feldspar	trace
		mica	<1
		montmorillonite (probably contains some hydroxy interlayers)	3+
		palygorskite	4+
EEF-75-21	Massive, white-buff laumontite and montmorillonite speckled with tiny fragments of muscovite. Pocket-filling	laumontite	4+
		muscovite	3+
		montmorillonite	2+
EEF-75-16*	Compact, tan-buff, waxy clay, pseudomorphous after elbaite with some assoc. lepidolite. From 'pink area', lower incline, pocket-filling.	beidellite	9+
		cookeite	trace

SDTM-1974Po1*	White, granular clay with assoc. pale pink clay, from the 'pit' in the 'pink area', (lower level incline before it was finished). Pocket-filling.	pink clay	
		beidellite	9+
		albite	trace
		stilbite	trace
		white clay	
		pollucite	4+
		montmorillonite	2+
		kaolinite	2+
		quartz	trace
		cookeite	trace
		lepidolite	trace
SDTM-1975-11	Pale pink 'pocket' clay coating composite lepidolite-muscovite 'book'. Fragments of achroite and pink elbaite enclosed as well From the 'Upper North Stope', Foord's Pit.	albite	1
		montmorillonite	4
		laumontite	5
SDTM-A	Shattered primary pocket minerals including quartz, pink elbaite, feldspars, and lepidolite; cemented by pale pink montmorillonite.	quartz	trace
		K-feldspar	4+
		mica	1
		montmorillonite	4
SDTM-B	Fragments of green and pink elbaite and feldspars, coated and enclosed within white, fine-grained, massive to radiating, fibrous masses of bavenite. Bavenite is cellular and filled with red-brown kaolinite. Portion of pocket contents.	albite	trace
		bavenite	7+
		elbaite	2
SDTM-1972AT	Elbaite crystals, pink with light green caps, being replaced by purple lepidolite. Green caps are much less susceptible to replacement and corrosion than pink elbaite. Portion of pocket contents.	lepidolite	6
		elbaite	4
SDTM-1975WP*	White, fine-grained 'pocket' clay, including fragments of pink and green elbaite, quartz and feldspars.	montmorillonite	9+
		lepidolite	<1
SDTM-1975PP*	Pale pink granular, homogeneous 'pocket' clay. Aggregate of clays, micas, zeolites, etc. Includes broken fragments of pink elbaite and some manganese oxide veinlets.	beidellite	10

SDTM-1975-24.8*	Shattered primary pocket minerals, filled and incorporated within pale pink clay.	montmorillonite quartz lepidolite	8 1 trace
SDTM-1984-12	White, flattened, dried masses of ´mountain leather´, stained by Fe and Mn oxides. Pocket-filling.	montmorillonite palygorskite	7+ 2+
SDTM-Tod	Black, sooty, pelletal, 1-2 mm, masses coating feldspar and quartz in a pocket.	todorokite quartz muscovite	8+ 1 1
	Himalaya Mine, Mesa Grande District		
Him-1	Pure white, granular pocket-filling clay with some zeolite.	laumontite montmorillonite bavenite	7+ trace 2
Him-2	Deep green elbaite crystal coated with buff-cream felted masses of fine-grained needles. Pocket-crystal.	bavenite elbaite 3+ faujasite	6+ trace?
Him-3	Cavernous, etched pink-purple lepidolite coated on one surface with white, fine-grained sparkling coating 0.5 to 1 mm thick. Traces of manganese oxides. From a pocket.	albite lepidolite montmorillonite	7+ 2+ trace?
Him-4	Purple lepidolite pseudohexagonal ´barrels´ 4-5 mm across, and 8 mm long, coating pink elbaite. White, pearly cookeite coats the lepidolite. From a pocket.	lepidolite cookeite montmorillonite	1 8+ trace
Him-5	Fine-grained 0.5 to 1.0 mm thick coating of mica on corroded and etched elbaite. Pink portion is skeletal while green cap is unattacked. Pocket material.	lithian muscovite or lepidolite	10
Him-6	Red-brown, late ´pocket´ clay coating quartz crystals.	kaolinite montmorillonite topaz	9+ trace? trace
Him-7	Fragmented smoky quartz, microcline, lepidolite and albite cemented together and coated by pearly cookeite. Pocket material.	cookeite (hand-picked)	10
Him-8	Dried and cracked buff-tan ´pocket´ clay on platy calcite, quartz, pink elbaite, albite, etc.	calcite quartz albite mica montmorillonite	2 <1 trace trace? 7

Him-9*	Microcline crystal fragment coated with pearly cookeite. Pocket material.	microcline cookeite	1+ 8+
Him-10*	Massive, white, elastic ´pocket´ clay coated with Fe-stained kaolinite.	palygorskite	10
Him-11	Red-brown kaolinite on top of palygorskite in pocket. Pocket material.	kaolinite	9+
Him-12	Fine grained white-cream sanidine(?)-orthoclase coating on top of microcline perthite. Coating is 1 to 6 mm thick. Pocket material.	K-feldspar albite	6+ 3+
Him-13	Pale pink, pure ´pocket´ clay, from 1984 workings.	montmorillonite or beidellite	10
Him-14	laumontite; white, granular, hard pocket-filling. Assoc. with quartz and pink elbaite.	laumontite	10
	Little Three Mine, Ramona district		
F-2	Fragmented pocket feldspars cemented by tan-brownish gray clay. Hercules workings.	albite microcline muscovite kaolinite montmorillonite	5 2+ trace <1 1+
F-1P	Vivid pink clay coating large lepidolite ´books`. June, 1976 Spaulding pocket in Main dike.	montmorillonite fluorapatite	9+ trace
F-1W	White, hard porcellaneous coating containing fragments of primary minerals coating lepidolite, blue topaz, and other pocket floor minerals. Spaulding pocket in Main dike.	high boron-containing K-feldspar(?) quartz lepidolite	+8 1 tr
LT-T	Olive green elbaite crystal coated with buff-cream fine-grained ´clay´. This crystal was on the roof of the pocket but was broken off and fell to the bottom before deposition of the white-buff ´snow on the roof´ coating. Spaulding pocket in Main dike.	orthoclase(?) albite mica	7+ 1+ 1+

	Ocean View (Eliz. R) Mine, Pala district		
OV-1	Red-brown clay taken from a 1 m wide pocket containing quartz, muscovite and feldspar; many large roots. Nearby large fractures in pegmatite. Located just west of 'spodumene column'.	quartz albite mica kaolinite vermiculite with hydroxy interlayers amphibole	2 <1 3+ 3 <1 <1
OV-2	Buff-pink 'pocket' clay taken from side of pocket near base. Pocket contains rootlets. About 6 meters in from south entrance to mine.	quartz albite mica cookeite kaolinite	<1 4+ 2+ 2+ trace
OV-3	Light reddish-brown 'pocket' clay taken from crack near base that ran into a layer of lepidolite. Approx. 7 meters in from south entrance of mine.	quartz albite lepidolite cookeite kaolinite	4+ 1+ 2+ <1 trace
OV-4	Altered spodumene from 'spodumene column', west side. Many roots nearby, also more Mn? staining than other samples. Light pink-cream.	quartz lepidolite cookeite kaolinite spodumene	trace? trace? <1 <1 8+
OV-5	Altered spodumene from 'spodumene column', south side. Light pink, sporadic dark staining.	quartz K-Fs lepidolite cookeite kaolinite spodumene	trace trace <1 1+ 1+ 6+
	Katrina Mine, Pala district		
K-P*	Pseudomorphous purplish-red 'pocket' clay, intermixed with white clay and clear relict fragments of kunzite. Some dendrites and patches of black manganese oxides present. Pink material is about 30% of total white and pink clay.	quartz albite cookeite montmorillonite (has about 25% nonexpansible layers)	2+ trace 2+ 4+
K-W*	Same as for K-P. Replacement has proceeded along cleavages and c direction of kunzite. White clay shells are immediately around the spodumene. Purple-red clay is infilling.	beidellite cookeite	9+ trace
	White Queen Mine, Pala district		
WQ-1	Vivid red-purple 'pocket' clay with some manganese oxide coating quartz.	quartz montmorillonite cookeite	<1 8+ trace

Tourmaline Queen Mine, Pala district

TQ-1	Deep red-brown 'pocket' clay with fragments of primary minerals, principally quartz.	kaolinite quartz	8+ 1+

Maple Lode Mine, Aguanga Mountain district

ML-1	Lepidolite, indicolite to achroite tourmaline and feldspars coated with a white, fine-grained material. Other samples have stilbite etc. coating primary minerals. Pocket material.	albite lepidolite K-feldspar	2+ 4 4

Notes- Exact locations for all but the Maple Lode mine are given in Foord (1976) and Jahns and Wright (1951). $^{+}$ on heating to $400^{0}C$, this montmorillonite collapses to a d_{001} spacing of 9.2A, which is much lower than the expected 9.8A spacing. The reason for this lower spacing has not yet been determined. * chemical analysis of clay given in Table 3.