

**Table 1.** Measured and Modeled Modal Mineralogies of Laboratory Samples

Sample and Phases	Measured, <sup>a</sup> vol %	Modeled, vol %	
		2 cm <sup>-1</sup> Sampling	10 cm <sup>-1</sup> Sampling
79-35i			
Feldspar	68	71	71
Silica phases	1	0	0
Low-Ca pyroxene	0	0	0
Pigeonite	0	0	0
High-Ca pyroxene	16	7	8
Olivine	14	21	20
79-3b			
Feldspar	76	78	75
Silica phases	5	0	0
Low-Ca pyroxene	1	1	2
Pigeonite	5	0	0
High-Ca pyroxene	8	10	10
Olivine	1	6	7
HCC4E			
Feldspar	48	52	47
Silica phases	12	1	0
Low-Ca pyroxene	0	0	1
Pigeonite	4	25	25
High-Ca pyroxene	31	19	22
Olivine	3	2	2
HCC4A			
Feldspar	48	57	54
Silica phases	11	5	5
Low-Ca pyroxene	0	0	0
Pigeonite	5	7	12
High-Ca pyroxene	29	18	16
Olivine	3	0	0
79-39d			
Feldspar	46	42	36
Silica phases	39	32	37
Low-Ca pyroxene	2	8	6
Pigeonite	4	0	0
High-Ca pyroxene	5	1	0
Olivine	1	9	9
HK-1			
Feldspar	53	51	50
Silica phases	37	15	15
Low-Ca pyroxene	1	7	9
Pigeonite	3	13	12
High-Ca pyroxene	3	8	7
Olivine	0	6	6
HK-3			
Feldspar	56	55	53
Silica phases	26	12	12
Low-Ca pyroxene	5	12	13
Pigeonite	8	5	5
High-Ca pyroxene	3	9	9
Olivine	0	6	6
HK-5			
Feldspar	53	53	51
Silica phases	25	13	13
Low-Ca pyroxene	8	8	8
Pigeonite	3	18	19
High-Ca pyroxene	6	3	3
Olivine	1	6	6
82-98			
Feldspar	39	46	46
Silica phases	49	27	31
Low-Ca pyroxene	4	5	8
Pigeonite	2	7	0
High-Ca pyroxene	3	6	4
Olivine	0	8	8

<sup>a</sup>Feature scan (microprobe) modes are from *Wyatt et al.* [this issue].

virtually the same values that were calculated for the 2 cm<sup>-1</sup> data [*Wyatt et al.*, this issue], which demonstrates that convolution to 10 cm<sup>-1</sup> spectral sampling does not noticeably alter the uncertainty associated with the derived mineralogy. Therefore, as in the case of the 2 cm<sup>-1</sup> data (see paper 1), the greatest uncertainties in the 10 cm<sup>-1</sup> data are associated with the silica phases and pigeonite.

Modal abundances obtained from 10 cm<sup>-1</sup> data commonly differ slightly from those obtained with 2 cm<sup>-1</sup> data but generally not by more than 5 vol % (absolute). A few outliers are present (Figure 2), most notably three points that represent five cases in which pigeonite or clinopyroxene phases that were identified in 2 cm<sup>-1</sup> data were not identified in the 10 cm<sup>-1</sup> data. For two of these points the abundance of pigeonite determined from data acquired at 2 cm<sup>-1</sup> sampling was <10 vol %, which is at or below the detectability limits usually associated with data acquired at 10 cm<sup>-1</sup> data [*Bandfield et al.*, 2000a; *Hamilton and Christensen*, 2000]. One of the rock samples has deconvolved mineralogies at both 2 and 10 cm<sup>-1</sup> sampling that include significant amounts of weathering products; this sample simply may not be modeled very accurately in either case as only a few weathering products were included in the end-member set. Finally, in the last two cases, pigeonite was not detected in the 10 cm<sup>-1</sup> data at ~12 vol % (2 cm<sup>-1</sup> data), but the clinopyroxene content was higher in the 10 cm<sup>-1</sup> data, suggesting that the spectrum was still best modeled with a calcium-bearing pyroxene. Despite these few outlier points the similarity in the 2 and 10 cm<sup>-1</sup> results indicates that the degradation of spectral resolution does not significantly alter the derived mineralogies. Therefore we expect that the chemistries derived from both data sets also will be similar.

In fact, chemistries derived from the 10 cm<sup>-1</sup> spectra are very similar to those derived using the 2 cm<sup>-1</sup> data. Table 2 shows the uncertainties in the 10 cm<sup>-1</sup> data compared to the same values for the 2 cm<sup>-1</sup> data. As an example of the consistency of our results, we have plotted the SiO<sub>2</sub> contents derived from the 2 and 10 cm<sup>-1</sup> laboratory samples against the rocks' known SiO<sub>2</sub> abundances in Figure 3. The minimum and maximum absolute difference between 2 and 10 cm<sup>-1</sup> modeled values are 0.1 and 2.3 wt %, respectively, with an average of only 0.5 wt %. Although bulk SiO<sub>2</sub> content is the most highly derived (model dependent) measure of composition in our studies, it is also one of the most accurate in terms of classifying the rocks [*Wyatt et al.*, this issue]. Therefore it is a good measure of the similarity and accuracy of the high- and low-resolution model results. As in the case of the 2 cm<sup>-1</sup> data, the worst relative errors are observed for TiO<sub>2</sub> (95%) and MgO (85%) (Table 2); however, neither of these oxides is used in any of our classification schemes.

In summary, degradation of the laboratory rock spectra to the spectral sampling of the TES instrument does not significantly alter the mineralogies and chemistries derived by linear deconvolution of the spectra. This result demonstrates that the traditional and new classification schemes of *Wyatt et al.* [this issue] are valid for the interpretation of TES-resolution data. The following discussion examines new deconvolution results for the TES Martian surface spectra in the context of the classification schemes discussed in paper 1.

#### 4. Martian Surface Compositions

*Christensen et al.* [2000a] identified a basaltic surface component in *Cimmeria Terra*, and *Bandfield et al.* [2000a] iden-