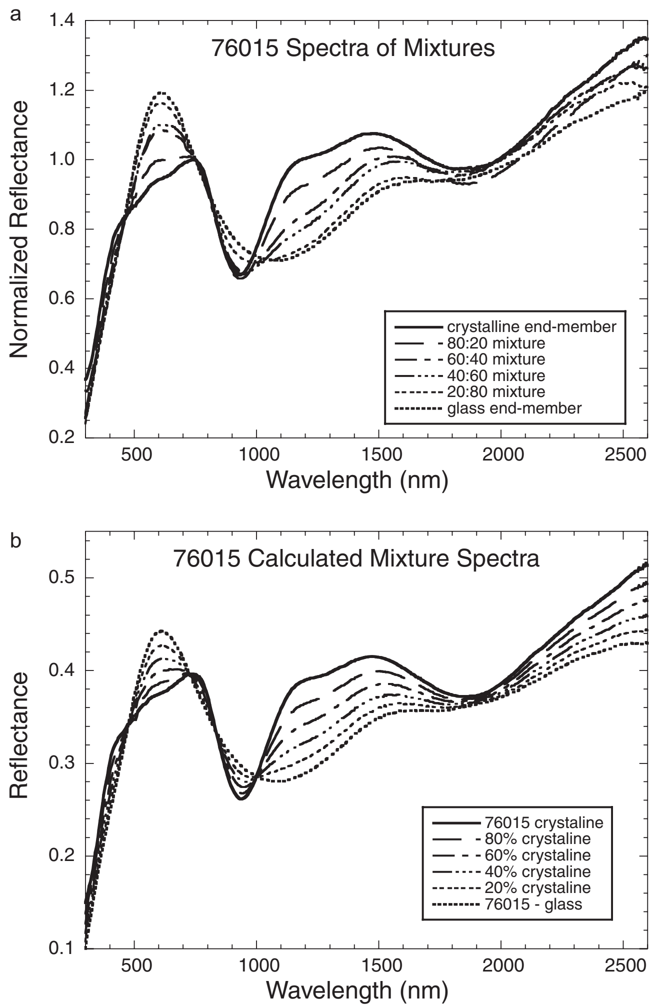

Fig. 6. a) Reflectance spectra for mass fraction mixtures of glass and crystalline samples for 76015. The spectra have been scaled to unity at 750 nm. The shape of the mafic absorption band near 1 μm varies continuously between the two endmembers. b) Spectra for calculated mixtures using only the two endmembers, crystalline and glass samples for 76015.

glass endmembers, however, provide a broad comparison (Fig. 6b), illustrating that the spectra of the physical mixtures provide an excellent qualitative data set from which to characterize glass/crystal mixtures.

The endmember spectra clearly show the diagnostic absorptions due to pyroxene and glass, respectively. The most obvious changes in the mixture spectra shown in Fig. 6 are in the shape of the 1 μm absorption band, as it broadens with increasing glass abundance and shifts to longer wavelengths. In both the natural and calculated mixtures, $>60\%$ glass appears necessary for its presence to be obvious in the mixture spectra. Comparison of both sets of mixture spectra with the telescopic spectra of large areas of pooled impact melt studied by Smrekar and Pieters (1985) indicates the presence of mixtures of glass and pyroxene on the surface and that the relative abundance of glass and crystalline material for the pooled impact melt at craters such as Copernicus or Tycho suggests glass abundances of 50% or more.

Suite 2: Natural Impact Melts

Suite 2 impact melts come from four Apollo sites and thus have diverse origins, but as described in Table 2, all share the common characteristic of exhibiting either a component of impact-derived glass or melt breccia. This suite of samples, also selected by Graham Ryder, was identified to begin filling the gaps in our knowledge of the spectral variability of natural impact melts (Ryder, personal communication; Ryder1993; Meyer 1994). The Suite 2 samples were selected from matrix material in impact melt breccias, unless otherwise noted in Table 2. Despite a range in chemical composition and glass abundance, the 15 samples exhibit spectra that fall into several general categories, the most common of which appears to be dominated by the texture of the melt breccia matrix. BDR spectra of Suite 2 impact melt samples are shown in Figs. 1f and 1g.

Group 2A

There is only one sample in the first group (76055), which is spectrally indistinguishable from an igneous noritic rock. The spectrum for this sample resembles the crystalline spectra for Suite 1 (and may also be part of the Serenitatis melt sheet). If the spectral categories for the Suite 2 samples are considered as a continuum in relative glass and crystal abundance, Category 2A is the crystalline endmember. The spectral characteristics for this category may be indicative of a slower cooling rate, as it lacks the spectral features in subsequent categories which appear to be associated with fine-grained nonequilibrium cooling or quenched melts.

Group 2B

The spectra in this group appear to contain a high abundance of quenched glass, and in fact resemble the glass-rich examples of Suite 1 mixture spectra (Fig. 6), as well as telescopic spectra for pooled melts at lunar impact craters (Smrekar and Pieters 1985). Group 2B spectra exhibit the characteristic broad glass absorption bands near 1 and 2 μm. The absorption band near 1 μm appears to be modified by small amounts of pyroxene in the sample. The two samples in this category, 64455 and 67095, were both partly coated with glass (Table 2), which makes up approximately 40% of the powdered samples.