

# STANDARD TEST METHOD 13

## FEI CUI (JADEITE JADE) INFRARED SPECTRUM EXAMINATION

### 1.1 SCOPE

This Standard describes the method of using an infrared spectrometer to verify the composition of the test Fei Cui (Jadeite Jade).

### 1.2 APPLICATION

The infrared spectrum examination applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

The infrared spectrum examination may be used for the identification of Fei Cui (Jadeite Jade) on its authenticity.

### 1.3 DEFINITIONS

**Polymer Impregnation:** A carbon-hydrogen bonded organic solid substance generally called polymer is impregnated in liquid form into a gemstone and solidified inside to improve the gemstone's transparency, clarity, colour distribution and saturation; but the gemstone's luster is detracted.

### 1.4 APPARATUS

The following apparatus is required:

A Fourier Transform Infrared Spectrometer (FTIR).

### 1.5 TEST ITEM

The infrared spectrum examination is a single unit test for a whole piece of test item in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

### 1.6 PROCEDURES

1. Any sample shall be removed from the sample holder of the spectrometer so that the beam part is clear.
2. A sample spectrum profile against a background spectrum profile that measures the response of the spectrometer without any sample placed shall be collected first.
3. The test jadeite jade shall be cleaned scrupulously

with a lint-free cloth before placing into the spectrometer.

4. For jadeite jade that is relatively thick, low transparency, mounted or wherever the transmittance method is not applicable, the reflectance method of infrared spectrum examination shall be used. The test jadeite jade shall be detected by using the probe of the spectrometer under this method.
5. For jadeite jade that is relatively thin, either the transmittance or reflectance method of infrared spectrum examination could be used. The test jadeite jade shall be installed through the sliding door of the spectrometer when using the transmittance method.
6. After placing the test jadeite jade in the appropriate place and orientation, at least 3 points shall be checked randomly. The spectrum profile shall then be collected.

Note:

For the surface of a jadeite jade that is less than 20mm in all dimensions, a 1-point random check shall be considered adequate.

The background spectrum shall be used to remove the effects caused by the instrument and atmospheric conditions, so that the peaks and troughs in the final spectrum profile shall be due solely to the sample divides the sample spectrum profile.

### 1.7 CALCULATION AND EXPRESSION OF RESULTS

Interpretation of the spectrum:

Transmittance Method:

The presence of a very intense group of peaks (strong absorption) between  $2850\text{cm}^{-1}$  and  $3100\text{cm}^{-1}$ , with apparent absorption maxima at approximately  $2940\text{cm}^{-1}$ ,  $3025\text{cm}^{-1}$ ,  $3060\text{cm}^{-1}$  and  $3080\text{cm}^{-1}$ , is the indication of polymer impregnation. (See Table A)

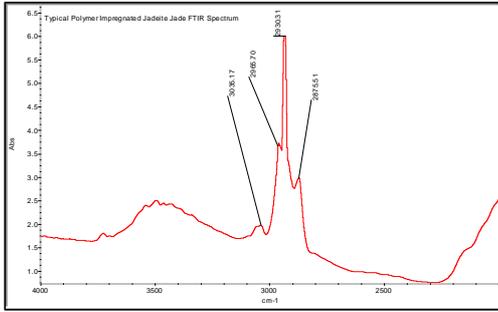


Table A: Spectrum of a typical polymer impregnated jadeite jade, transmittance method.

**Reflectance Method:**

The presence of a group of peaks and troughs at either  $5900\text{cm}^{-1}$  or  $4680\text{cm}^{-1}$ , with apparent absorption maxima at approximately  $5985\text{cm}^{-1}$ ,  $5918\text{cm}^{-1}$  or  $4681\text{cm}^{-1}$  and  $4618\text{cm}^{-1}$ , is the indication of polymer impregnation. (See Table B)

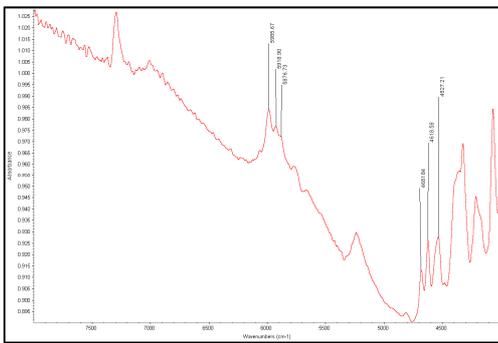


Table B: Spectrum of a typical polymer impregnated jadeite jade, showing groups of peaks and troughs at both  $5900\text{cm}^{-1}$  or  $4680\text{cm}^{-1}$  using reflectance method.

The test jadeite jade shall be identified as no polymer detected only if all the checking(s) do not show any indication of polymer impregnation.

**1.8 TEST REPORT**

The report shall affirm that the test was carried out in accordance with this Standard. The infrared spectrum examination should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, shape and cut identification, measurement of dimensions and weight, identification of transparency, determination of specific gravity & refractive index, examination of fluorescence, magnification examination, spectroscopic examination and Chelsea Colour Filter examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of infrared spectrum examination.
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing.