



IRP

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UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA

FTIR spectroscopic study of the crucible for a melting furnace

R+D Project AICO/2021/095

“Developing strategies against climate change for the preventive conservation of Valencian railway-tramway heritage”

Financial support by *Consellería de Innovación, Universidades, Ciencia y Sociedad Digital. Dirección General de Ciencia e Investigación. Subvenciones para la realización de proyectos I+D+i desarrollados por grupos de investigación consolidados 2021*

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Instrumentation:

Vertex 70 supplied by Bruker with a FR-DTGS (fast recovery deuterated triglycine sulphate) temperature-stabilised coated detector and a MKII Golden Gate Attenuated Total Reflectance (ATR) accessory and a OPUS/IR software.

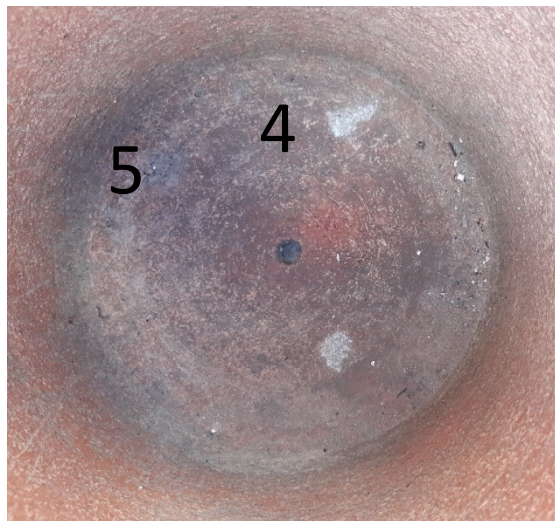
Working conditions:

Attenuated attetotal reflectance (ATR) mode

Num scans acquired: 32 scans

Resolution: 4 cm⁻¹

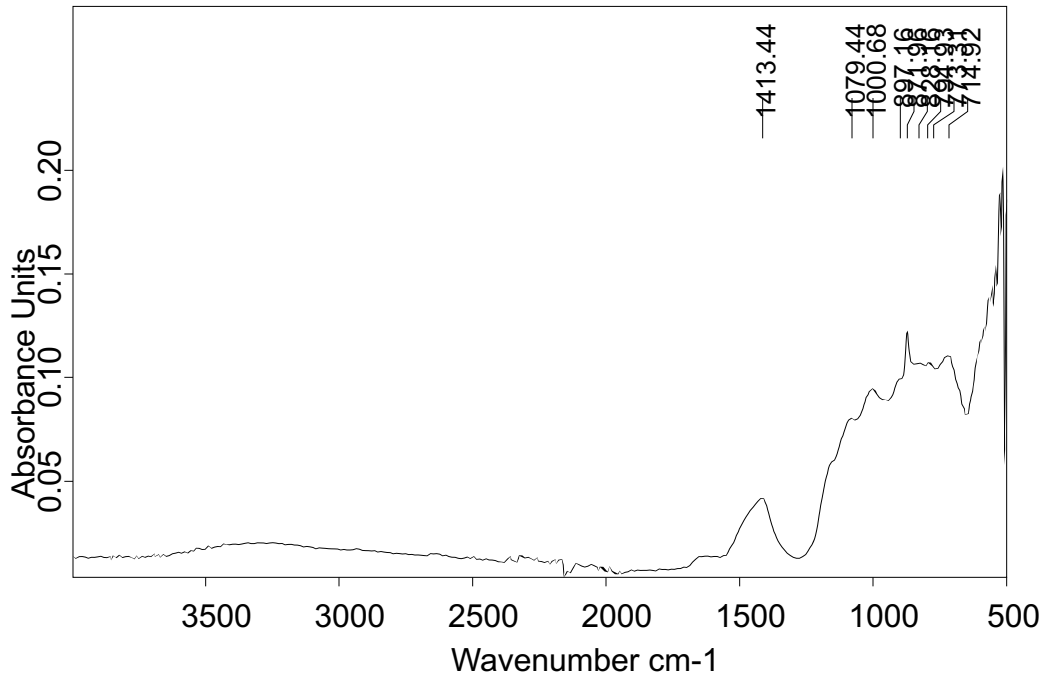
Sampling points



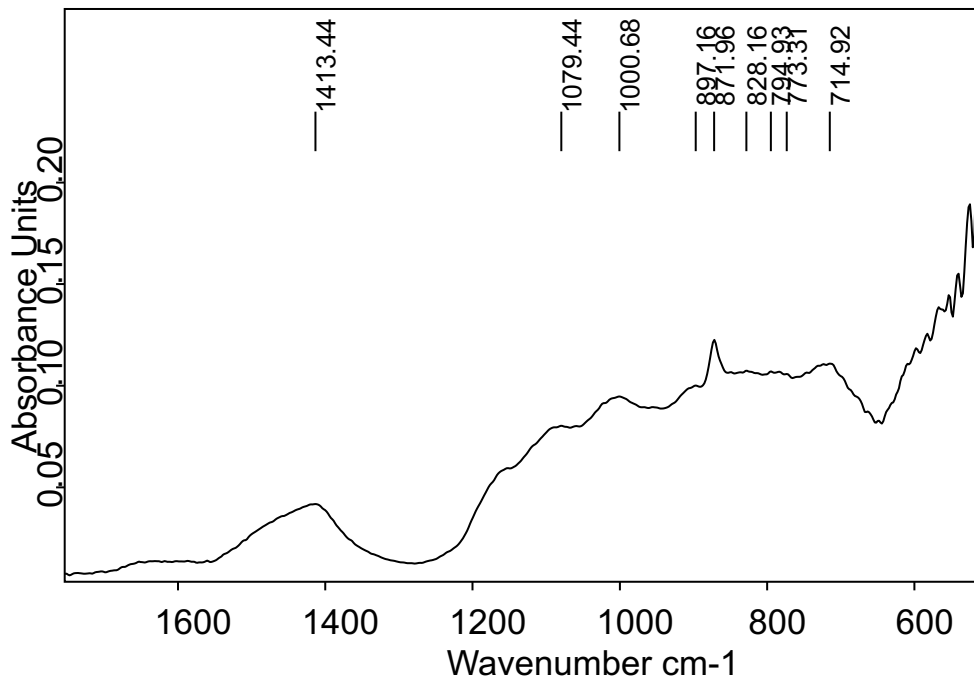
Sample: Refractory ceramic material

Ref: 1

Sampling point: external side



Espectro IR de la muestra pulverizada.

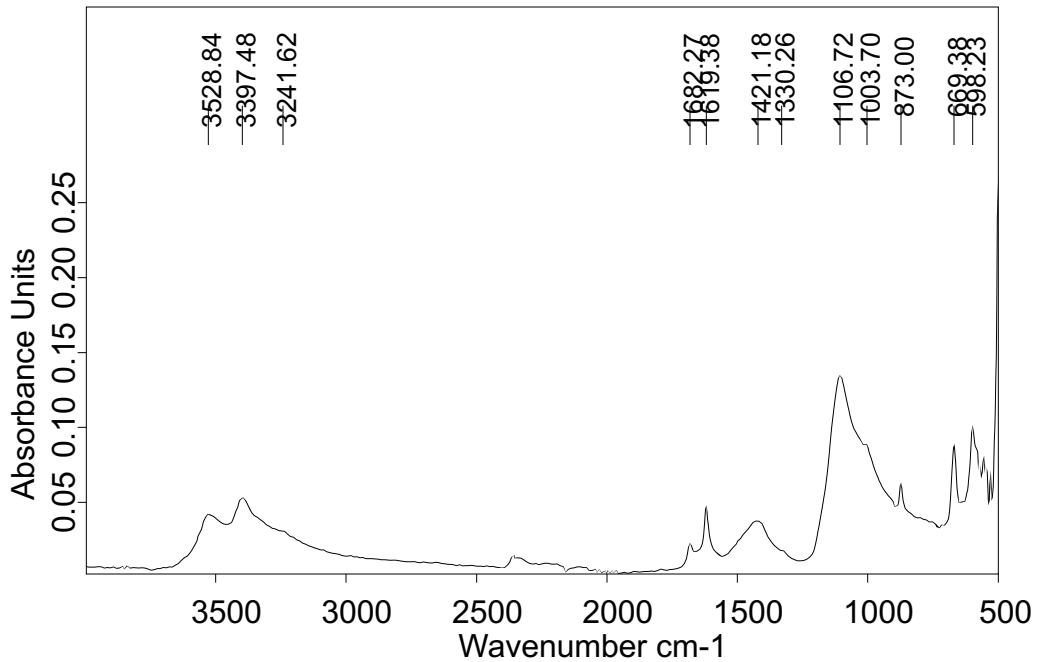


Espectro IR de la muestra pulverizada. Detalle de la región de la huella dactilar

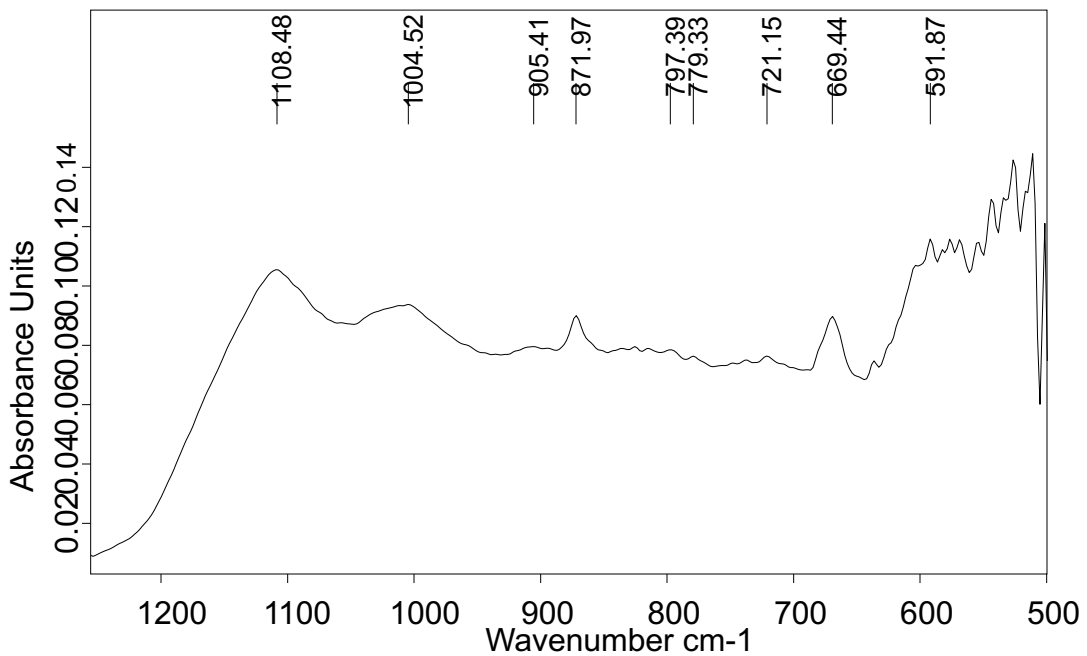
IR bands assignment FTIR

Band position IR (cm ⁻¹)	Assignment	Compound identified
1413	Stretching ν_3 group carbonate	Calcite
1079	Stretching ν group silicate	Quartz
1000	Stretching ν group silicate	Siliceous minerals
897	Stretching ν group silicate	Siliceous minerals
871	Stretching ν_2 group carbonate	Dolomitic calcite
828	Stretching ν_2 group nitrate	Sodium/potassium/ammonium nitrate
794, 773	Stretching OTZ	Material cerámico
714	Stretching ν_4 group carbonate	Dolomitic calcite

Sample: Efflorescences
Ref: 2
Sampling point: external side



Espectro IR de la muestra pulverizada



Espectro IR de la muestra pulverizada. Detalle de la región de la huella dactilar

IR bands assignment FTIR

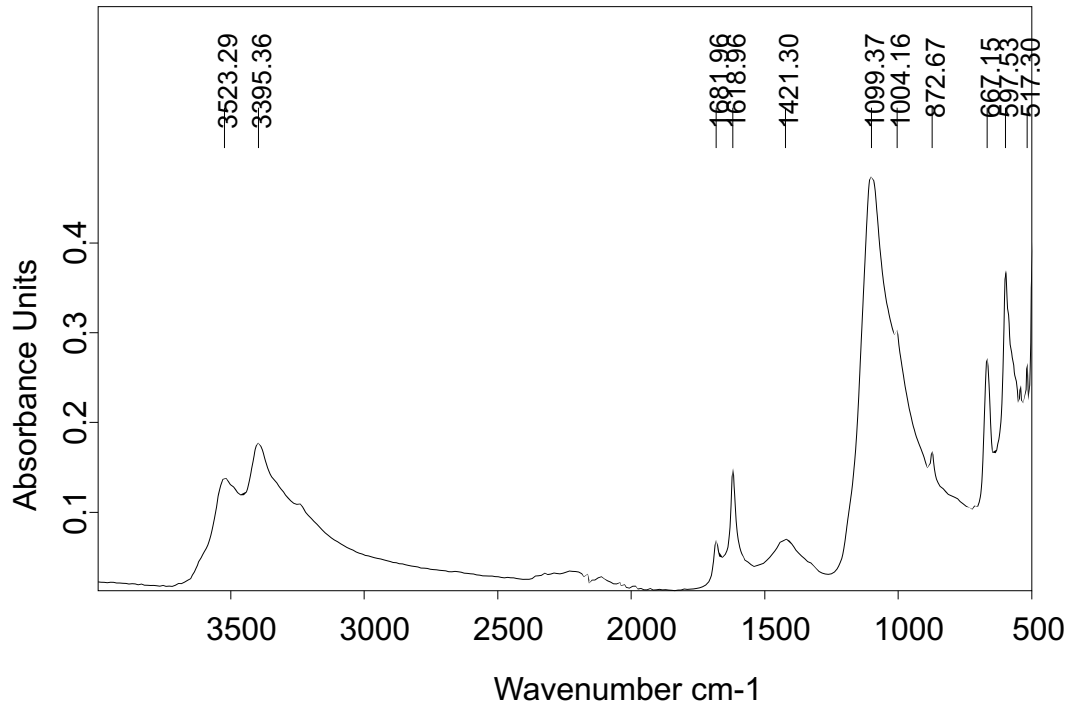
Band position IR (cm^{-1})	Assignment	Compound identified
3528, 3397	Stretching grupo-OH	Gypsum
3241 (sh)	Stretching grupo-OH	Sodium nitrate
1682, 1619	Deformation -OH	Yeso
1421	Stretching ν_3 group carbonate	Dolomitic calcite
1330	Stretching ν_3 group nitrate	Sodium/potassium/ammonium nitrate
1106	Stretching ν_3 group sulfate	Gypsum
1003	Stretching ν group silicate	Siliceous minerals
905	Stretching ν group silicate	Siliceous minerals
873	Stretching ν_2 group carbonate	Dolomitic calcite
797, 779	Stretching OTZ	Material cerámico
721	Stretching ν_4 group carbonate	Dolomitic calcite
669, 598	Stretching ν_4 group sulfate	Gypsum

sh: shoulder

Sample: filling material in hole

Ref: 3

Sampling point: inner surface



Espectro IR de la muestra pulverizada

IR bands assignment FTIR

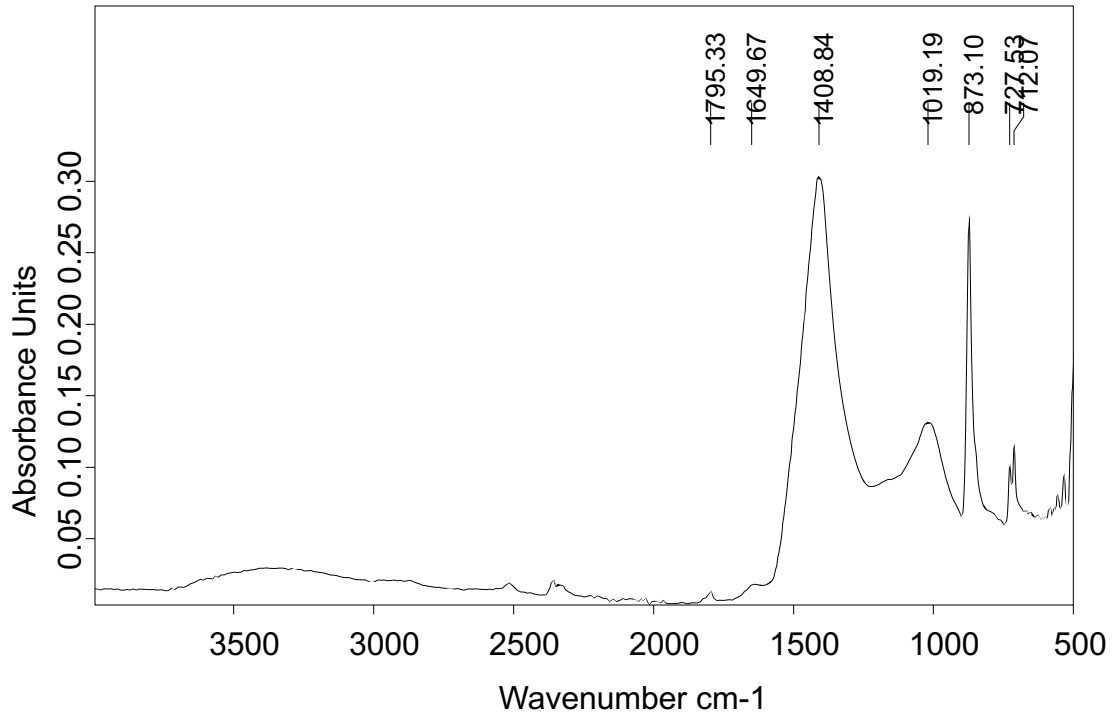
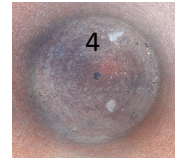
Band position IR (cm ⁻¹)	Assignment	Compound identified
3523, 3395	Stretching grupo-OH	Gypsum
1681, 1618	Deformation -OH	Yeso
1421	Stretching ν_3 group carbonate	Calcite
1099, 1004(sh)	Stretching ν_3 group sulfate	Gypsum
872	Stretching ν_2 group carbonate	Calcite
667, 597	Stretching ν_4 group sulfate	Gypsum

sh: shoulder

Sample: White spot in the bottom

Ref: 4

Sampling point: inner surface



Espectro IR de la muestra pulverizada

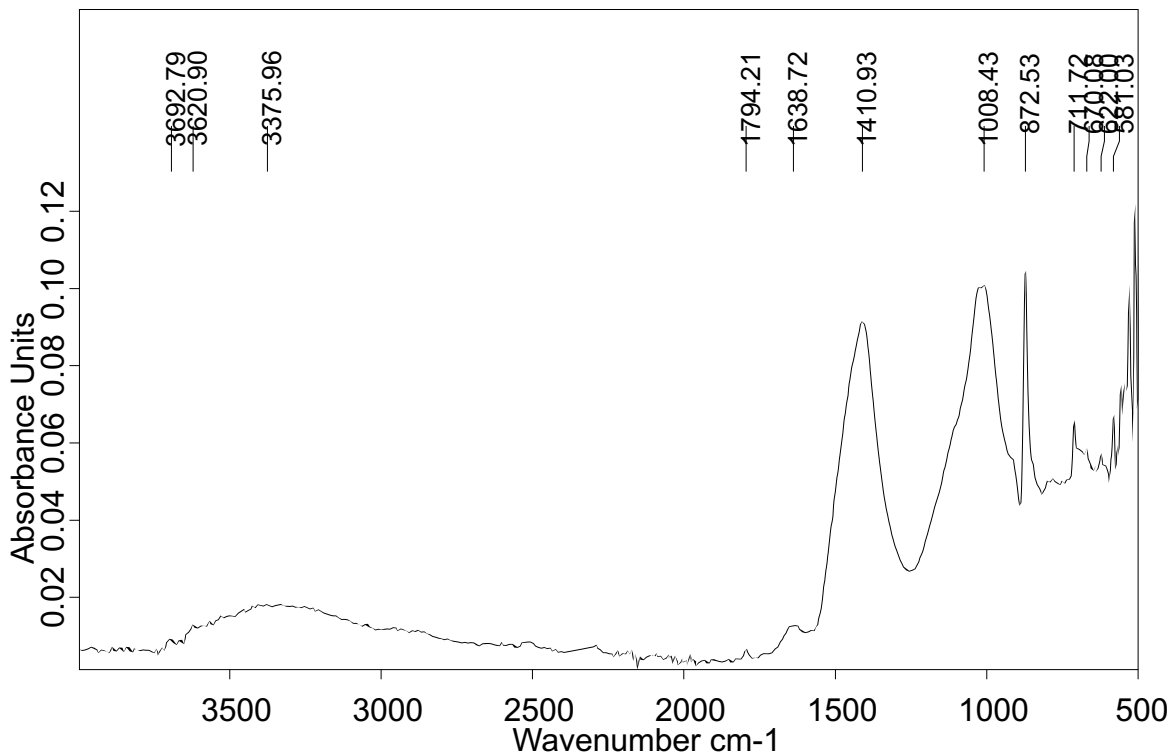
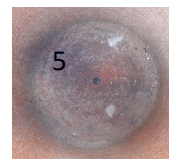
IR bands assignment FTIR

Band position IR (cm⁻¹)	Assignment	Compound identified
1649	Deformation -OH	Water physically sorbed
1408	Stretching ν_3 group carbonate	Calcite, dolomite
1019	Stretching ν group silicate	Clayey minerals
873	Calcite, dolomite	Calcite, dolomite
728, 721	Stretching ν_4 group carbonate	Calcite, dolomite

Sample: Brown-grey deposits

Ref: 5

Sampling point: inner side



Espectro IR de la muestra pulverizada

IR bands assignment FTIR

Band position IR (cm⁻¹)	Assignment	Compound identified
3693,3621, 3376	Stretching grupo-OH	Clay
1639	Deformation -OH	Clay
1411	Stretching ν_3 group carbonate	Calcite
1027	Stretching ν_4 group phosphate	Apatitic minerals
1008	Stretching ν group silicate	Siliceous minerals
873	Stretching ν_2 group carbonate	Calcite
712	Stretching ν_4 group carbonate	Calcite
670, 622, 598	Stretching ν_4 group phosphate	Apatitic minerals