

## REPORT OF ANALYSIS OF RESULTS

<b>Applicant of the analysis:</b>	RECREUS INDUSTRIES S.L.
<b>Applicant of the report:</b>	RECREUS INDUSTRIES S.L.
<b>Application reference:</b>	21310887 (PHYSICAL ADSORPTION OF GASES)
<b>Date of application</b>	31/03/2021
<b>Date of analysis:</b>	30/04/2021
<b>Lab:</b>	THERMAL ANALYSIS AND CHARACTERIZATION OF POROUS TEXTURE

### SAMPLE IDENTIFICATION AND DESCRIPTION

The user sends three samples of polymer pellets. The samples received are named Recreus PET G purifier-4, Recreus PLA purifier-4 and Recreus FilaFlex purifier-6.



Adsorció Física de Gasos  
 Adsorción Física de Gases  
 Recepció de mostres/Recepción de Muestras  
 Serveis Tècnics d'Investigació/Servicios Técnicos de Investigación

Solicitud: 21.310.088

Solicitante: primiab global

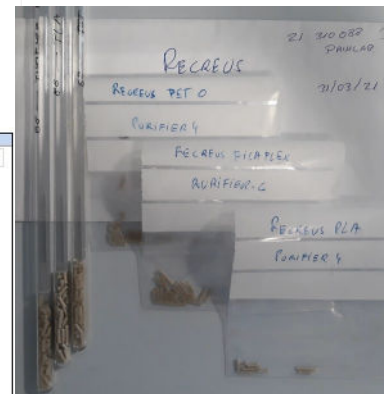
Muestras solicitadas y requisitos del ensayo

Recuerde utilizar el carácter ',' en vez de '.' en el caso de introducir valores decimales  
 Puede consignar un máximo de 5 lotes/líneas por solicitud

Conozco los requisitos que deben cumplir las muestras para la realización de los ensayos.

Id. Muestra	Datos de la Muestra	Características del Ensayo	Resultados
1 Recreus	Conservación: T. Ambiente	El ensayo se realizará con: 1000 mg de muestra	<input type="checkbox"/> Haga clic aquí para adjuntar un archivo
2 Recreus	Estabilidad	El análisis se realizará en el equipo: o bien el equipo será a elección del servicio <input checked="" type="checkbox"/>	
3 Recreus	Estabilidad: <input checked="" type="checkbox"/> Insertar elemento ¿Muestra tóxica? <input type="radio"/> Sí <input checked="" type="radio"/> No ¿Muestra pegajosa? <input type="radio"/> Sí <input checked="" type="radio"/> No	<input checked="" type="checkbox"/> Isotherma de N <sub>2</sub> <input checked="" type="checkbox"/> Isotherma de CO <sub>2</sub> <input checked="" type="checkbox"/> a 273 K <input checked="" type="checkbox"/> a 298 K <input type="checkbox"/> Isotherma de Ar Condiciones de desgasificación A elección: <input type="text"/> BOPC por 30 hr ¿Recuperar muestra tras la isoterma? <input type="radio"/> Sí <input checked="" type="radio"/> No Superficie BET (m <sup>2</sup> /g) Aprox: <input type="text"/>	
Total: 3 <input type="button" value="Insertar elemento"/>			

Total Muestras Solicitadas: 3



## **EXPERIMENTAL**

The measurement of CO<sub>2</sub> adsorption at 298K (25°C) is carried out using an automatic volumetric adsorption equipment of the Quantachrome brand, model Autosorb iQ located in the laboratory of Porous Texture Characterization of the SSTTI of the University of Alicante. The equipment is adjusted and verified according to the laboratory's internal procedures. A recirculating thermostatic bath is used to control the sample temperature. The samples are activated by vacuum heat treatment using the degassing unit of the Autosorb iQ (Quantachrome). The activation/degassing conditions are 80°C, 20 hours under vacuum. The sample mass used in the analysis is close to 1 g.

The analysis is carried out using a pressure table between 10-3Torr and 760Torr with an equilibration time of 12 minutes. This parameter indicates the time that the pressure must remain unchanged (within limits set by the equipment) to consider that a point of the isotherm is in equilibrium.

## **RESULTS**

Figures 2 to 4 show the CO<sub>2</sub> adsorption isotherms at 298K of the analyzed samples, expressed in STP Volume (cc/g) vs CO<sub>2</sub> Absolute Pressure (Torr).

**Quantachrome® ASiQwin™ - Automated Gas Sorption Data**  
**Acquisition and Reduction**  
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 version 3.01

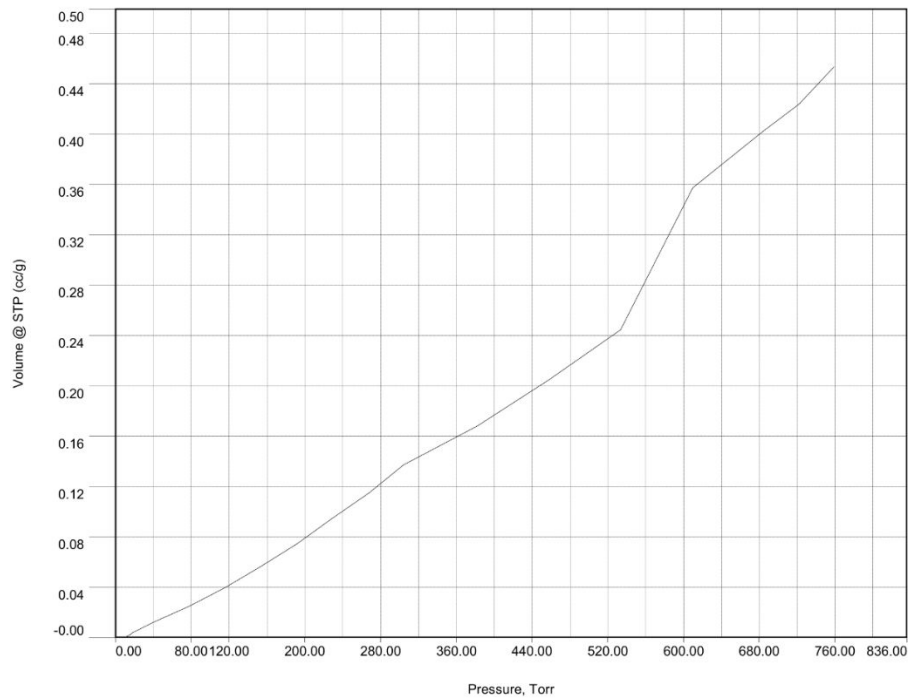


<b>Analysis</b>			<b>Report</b>	
<b>Operator:</b>	admin	<b>Date:</b> 2021/04/30	<b>Operator:</b>	admin
<b>Sample ID:</b>	1_Recreus PET 0 purefier	<b>Filename:</b>	<b>iq_300421E2.qps</b>	<b>Date:</b> 2021/05/04

**Absolute Pressure**

Adsorbate	Data Reduction Parameters		
	Thermal Transpiration: on Po override: 48095.00 Torr CO2 Alicante Molec. Wt.: 44.010	Eff. mol. diameter (D): 3.54 Å  Temperature 298.150K Cross Section: 21.000 Å²	Eff. cell stem diam. (d): 4.0000 mm  Liquid Density: 1.023 g/cc

Ads



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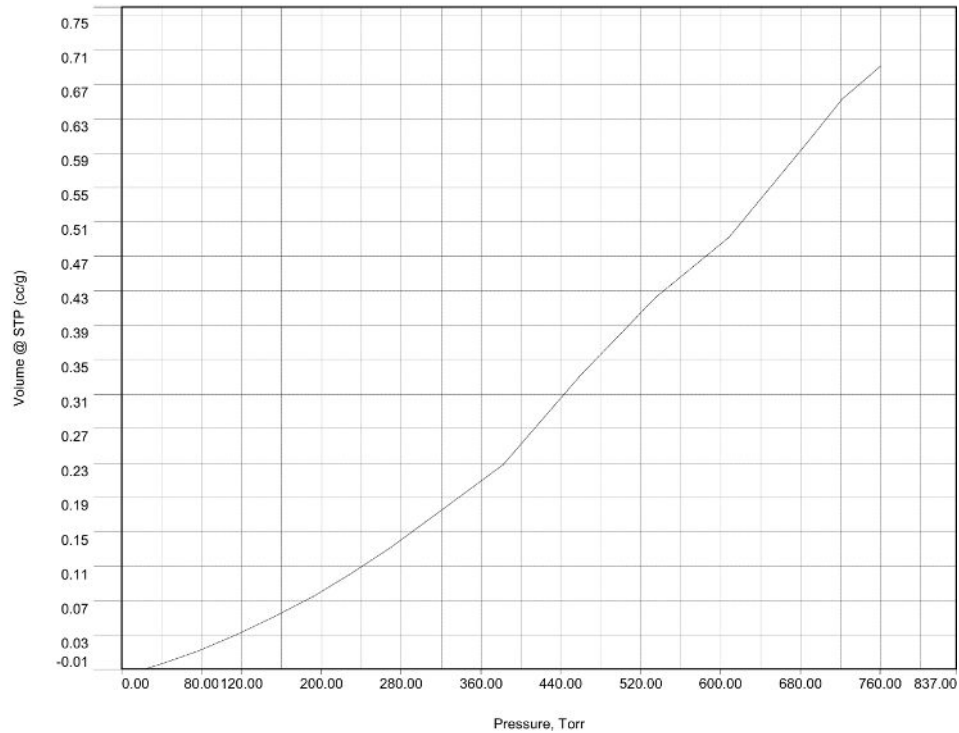


<b>Analysis</b>			<b>Report</b>	
<b>Operator:</b>	admin	<b>Date:</b> 2021/05/04	<b>Operator:</b>	admin
<b>Sample ID:</b>	2_Recreus PLA purifier-4	<b>Filename:</b>	iQ_040521E1.qps	<b>Date:</b> 2021/05/05

### Absolute Pressure

<b>Adsorbate</b>	Thermal Transpiration: on	<b>Data Reduction Parameters</b>	Eff. cell stem diam. (d): 4.0000 mm
	Po override: 48095.00 Torr	Eff. mol. diameter (D): 3.54 Å	
	CO2 Alicante	Temperature: 298.150K	Liquid Density: 1.023 g/cc
	Molec. Wt.: 44.010	Cross Section: 21.000 Å²	

Ads
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Figura 3. Muestra Recreus PLA purifier-4.

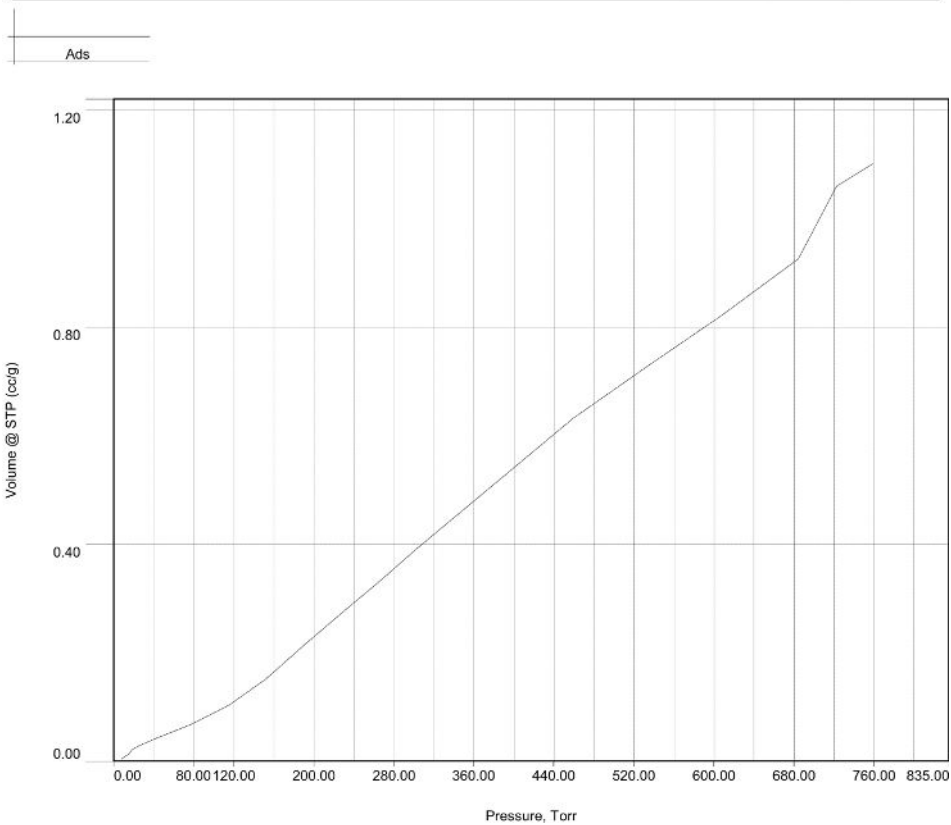
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<b>Analysis</b>			<b>Report</b>	
<b>Operator:</b>	admin	<b>Date:</b> 2021/05/04	<b>Operator:</b>	admin
<b>Sample ID:</b>	3_Recreus Filaflex purifier-6	<b>Filename:</b>	iQ_040521E2.qps	<b>Date:</b> 2021/05/05

**Absolute Pressure**

<b>Adsorbate</b>	Thermal Transpiration: on	<b>Data Reduction Parameters</b>	
	Po override: 48095.00 Torr	Eff. mol. diameter (D): 3.54 Å	Eff. cell stem diam. (d): 4.0000 mm
	CO2 Alicante	Temperature: 298.150K	Liquid Density: 1.023 g/cc
	Molec. Wt.: 44.010	Cross Section: 21.000 Å²	



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Figura 4. Muestra Recreus FilaFlex purifier-6.

## CO2 adsorption results at 298K.

**Table 1. Amount of CO2 adsorbed at 1 atm (760 Torr)**

Muestra	V <sub>STP</sub> /g sample (cm <sup>3</sup> /g)	g of CO <sub>2</sub> / g sample	% weight
Recreus PET G purifier-4	0,4522	0,0009	0,089
Recreus PLA purifier-4	0,6908	0,0014	0,136
Recreus FilaFlex purifier-6	1,1004	0,0022	0,216

Alicante, 5 de mayo de 2021

### Technician

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Sara Llopis Verdú

### Unit Manager

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### Manager SSTTI

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María José Muñoz Guillena

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