

CABOT



LP Series
Carbon
Blacks

SOLUTIONS FOR RUBBER APPLICATIONS REQUIRING LOW PAH CONTENT

eApplication Guide



Low PAH “LP” Series Carbon Blacks

- ◆ Carbon black plays a key role in the manufacture of rubber compounds by delivering a variety of performance properties to the final product.
- ◆ A growing number of regulatory requirements and certifications restricts the polycyclic aromatic hydrocarbon (PAH) content in certain rubber parts used in consumer articles as well as in food and potable water contact applications.
- ◆ Cabot Corporation has engineered carbon blacks that meet stringent performance specifications while at the same time reducing the overall PAH concentration of the final article to ensure compliance with regulatory requirements and certifications.



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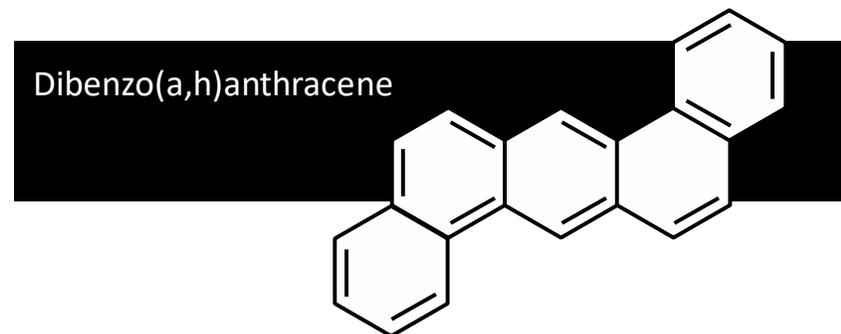
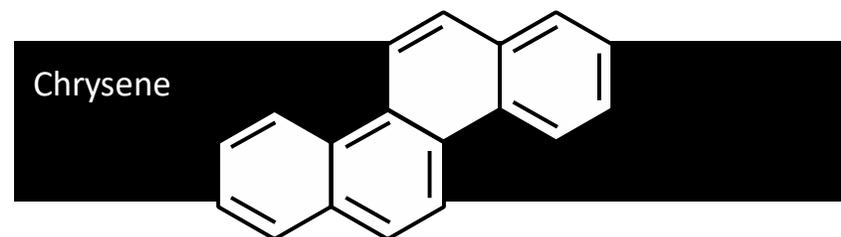
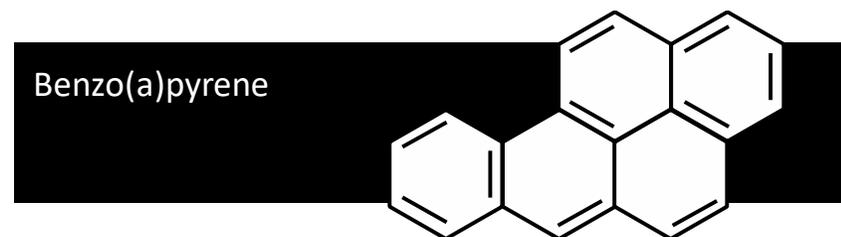
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What are PAH?

- ◆ Polycyclic aromatic hydrocarbons (PAH) are a group of chemicals composed of multiple aromatic rings.
- ◆ They are found naturally in the environment but also can be formed during the burning of fossil fuels or other organic matter.
- ◆ Some PAH have the potential to cause adverse human health effects.
- ◆ PAH are adsorbed on the surface of carbon black during manufacturing.
- ◆ Several studies have concluded that these PAH are firmly bound to the carbon black surface under normal handling and use.

Chemical Structure of some PAHs



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Carbon Black & PAH

- ◆ PAH adsorbed on the surface of carbon black during manufacturing can only be extracted from the surface of the carbon black under rigorous laboratory conditions with strong solvents at elevated temperatures.
- ◆ They are not bioavailable and do not migrate from carbon black in aqueous simulants of saliva, sweat or lung fluid.
- ◆ PAH content may vary significantly between grades as well as within the same grade of carbon black, depending on manufacturing conditions and technology.



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Regulatory Requirements

- ◆ Various country regulations, guidelines and certifications restrict the content of certain PAH in carbon blacks used for specific applications and/or plastic or rubber parts. Typical examples include consumer goods that may come into contact with skin, toys and childcare items and rubber parts that may come into contact with food and drinking water.
- ◆ These regulations, guidelines and certifications are subject to change as they relate to:
 - Region, country and implementation date
 - Restrictions of which final rubber article or carbon black is impacted
 - Restricted PAH and content

Your Cabot technical service representative can provide an in-depth explanation and overview on the specific details and status of existing regulations, guidelines and certifications.



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Cabot LP Series Carbon Blacks

- ◆ The LP series of low PAH products currently consists of 4 carbon blacks.
 - > **SPHERON® SO-LP carbon black**
 - > **SPHERON® 4000-LP carbon black**
 - > **VULCAN® 3-LP carbon black**
 - > **VULCAN® 6-LP carbon black**
- ◆ Our LP carbon black series is manufactured via a special process resulting in a controlled, very low level of PAH.

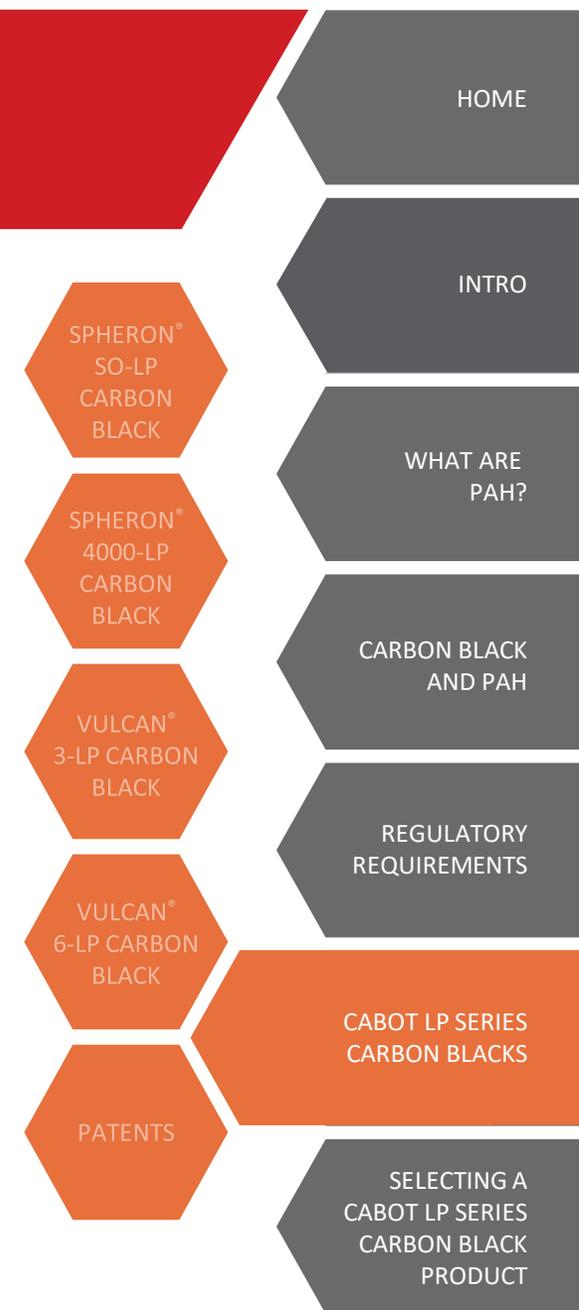
Standard Sales Specification

PAH Content*	Test Method	Units	Max Value
Benzo(a)pyrene	Cabot internal test	ppm	0.25
For each of 8 PAH included in EU list	Cabot internal test	ppm	1
For sum of 18 PAH included in GS Mark list**	Cabot internal test	ppm	20

Contact your Cabot Technical Service representative to learn more about possible Cabot Confidential Product Specifications to meet your specific requirements.

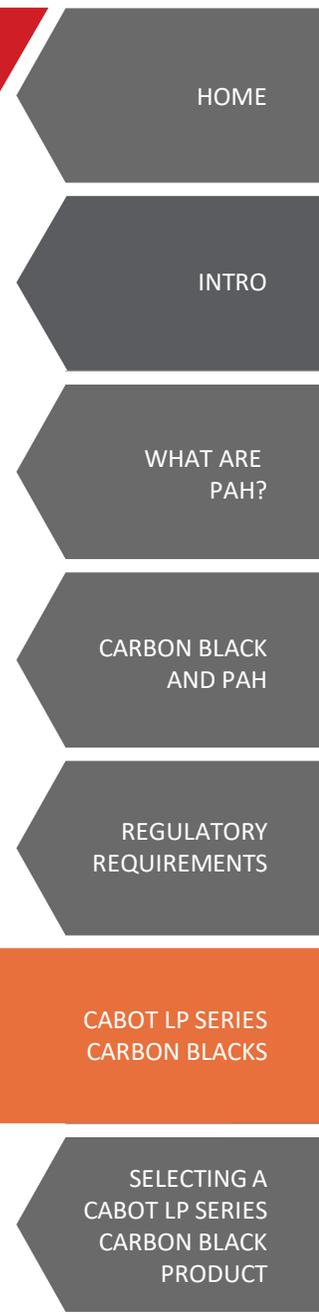
* Cabot internal test method requires 48 hours toluene extraction (Soxhlet).

** For products certified after July 1, 2020, GS Mark has reduced the list of PAH to 15. Cabot will continue to report the sum of 18 PAH, which covers all GS Mark certifications.



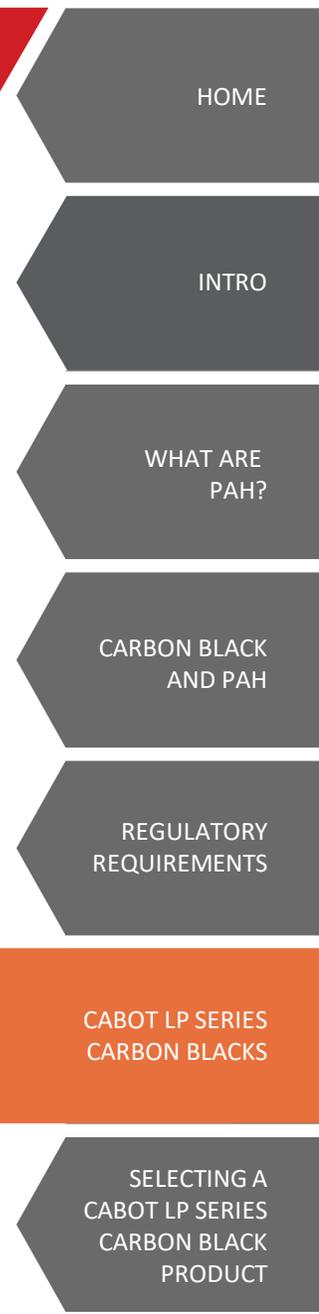
SPHERON® SO-LP Carbon Black

- ◆ This pelletized semi-reinforcing carbon black has a very high structure, is easy to disperse and provides very good extrusion properties to rubber compounds.
- ◆ **SPHERON® SO-LP carbon black** is the recommended product for rubber compounds that require a very low level of PAH and are currently based on standard ASTM 650, N683, N539 and N550 carbon blacks.



SPHERON[®] 4000-LP Carbon Black

- ◆ This pelletized semi-reinforcing carbon black has a very low surface area and structure. It offers excellent rubber compound flowability by imparting low viscosity even at high loadings.
- ◆ **SPHERON[®] 4000-LP carbon black** is the product of choice for replacing ASTM N762, N772 and N774 carbon blacks in very low PAH content applications.
- ◆ Blends of **SPHERON[®] SO-LP carbon black** and **SPHERON[®] 4000-LP carbon black** can be used in very low PAH applications that require rubber reinforcement properties of ASTM N660 carbon black.



VULCAN® 3-LP Carbon Black

- ◆ This pelletized reinforcing carbon black is recommended for rubber articles that require a very low level of PAH and higher reinforcement, strength, abrasion and tearing resistance level than is offered by semi-reinforcing carbon blacks.
- ◆ **VULCAN® 3-LP carbon black** is recommended for very low PAH applications that require the rubber reinforcement properties of those offered by ASTM N300 series carbon blacks.



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VULCAN[®] 6-LP Carbon Black

- ◆ This pelletized reinforcing carbon black is recommended for rubber articles that require a very low level of PAH and higher reinforcement, strength, abrasion and tearing resistance level than is offered by **SPHERON[®] SO-LP**, **SPHERON[®] 4000-LP** or **VULCAN[®] 3-LP carbon blacks**.
- ◆ **VULCAN[®] 6-LP carbon black** is the product of choice for very low PAH applications that require the rubber reinforcement properties of those offered by ASTM N200 series carbon blacks.



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Patents

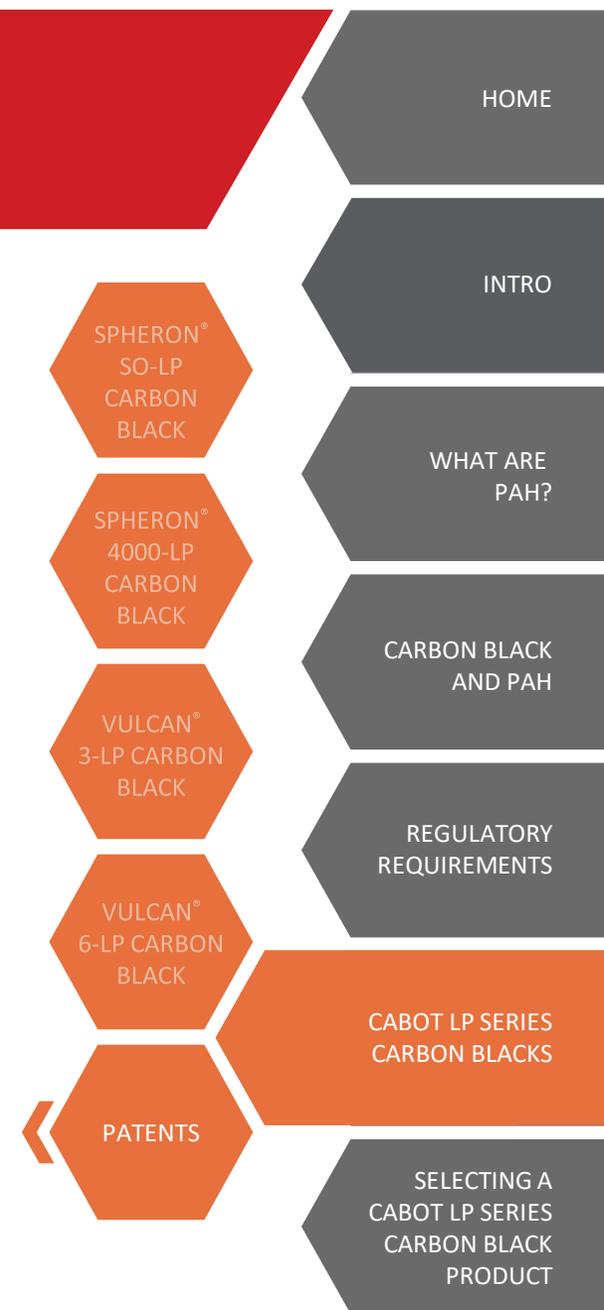
One or more of the Cabot LP series carbon black products may be covered by one or more of the following patents and pending patent applications:

Patents:

- ◆ CN101573417B
- ◆ JP6096399
- ◆ TW1414564
- ◆ US8710136B
- ◆ EP2087046
- ◆ MY160001
- ◆ US8034316B

Pending Patent Application:

- ◆ TH100036



Selecting a Cabot LP Series Carbon Black Product

- ◆ Our LP series carbon blacks provide our customers with a choice of products to be used as alternatives to traditional ASTM carbon blacks in applications requiring lower PAH content.
- ◆ Cabot's Technical Services Team will work closely with you to solve your challenges by leveraging our decades of knowledge in carbon black material science, elastomer formulation and production, and manufacturing techniques for a wide variety of industrial rubber product applications.

To contact our team, please visit cabotcorp.com/contact

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