ARDL

Akron Rubber Development Laboratory, Inc.

Chemical Testing

What's In Your Compound?

ARDL's chemical services laboratory specializes in analyzing composite rubber along with thermoset and thermoplastic material compounds. A full range of services is available, from single material identification to complete analysis and theoretical formula reconstruction.

Why Perform Such a Detailed Analysis?

Complex analysis performed at ARDL, such as the chemical reconstruction of an elastomeric material, can aid you in:

- Assuring the quality of ingredients in your material
- Finding the root cause of catastrophic or premature failure
- Reducing the cost of material development
- Supporting you during forensic investigation and litigation
- Enabling you to keep up with your competitors
- Eliminating product performance variations
- Investigating possible patent infringement
- Determining ingredients for FDA approval
- Ensuring specification compliance
- Verifying the approval and acceptance of imported goods by US Customs

ARDL is an independent laboratory and will identify the root cause of failure, regardless of its origin, and will assist you in rectifying the problem.

Example:
Typical Rubber Compound Analysis & Carbon Black Typing

COMPOUND ANALYSIS

Date:	January 10, 2022
Attention:	Ms. Mary Ann Jones
Address:	XYZ Corporation

Sample ID:	Competitor's Rubber
Sample Color:	Black
Project No:	123456

A. Polymer Identification
(Infrared Spectroscopy) — **Percent of RHC**

1. Polyisoprene Rubber 80
2. Styrene-Butadiene Rubber 20
3.

B. Ash Content 9.8%

C. Semi-Quantitative Ash Analysis
(ICP Mass Spectroscopy and EDX)

a. >10% ..... *Si*
b. 5-25% ..... Zn
c. 1-10% .....
d. 0.5-5% .....
e. 0.1-1% ..... *CA*
f. 0.05-0.5% .....
g. 0.01-0.1% ..... *Mg, Al*
i. Below Detection ..... *Bi, P, Ti, Mn, Sn, Na, Fe, Ni Cu, Se, Sb, Ba, Pb*

D. Total Hydrocarbon 55.5%

E. Total Sulfur, Leco Method 1.60%

F. Density ..... 1.193 Mg/m^3

G. Wax Content ..... Present

H. Extractables
Solvent Extractables, % 8.1%

1. Color ..... Amber
2. Consistency ..... Semi-Solid

I. Carbon Black 25.0%

1. ASTM Series Black N300

J. Extract Analysis

1. Plasticizers
   a. Hydrocarbon Oil
   b.
   c.
2. Antioxidants
   a. Santoflex 6PPD
   b.
   c.
3. Accelerators *(Suggested)*
   a. Sulfenamide (TBBS)
   b. Santogard PVI
   c.

K. Beilstein, Presence of Halogens ..... Negative

L. Microhardness
IRHD 61

General information provided by a reverse engineering analysis:

- Accelerators - Qualitative Only
- Antioxidant Identification
- Carbon Black Content
- Halogen Presence
- Percent Total Extract
- Plasticizer Identification
- Rubber Hydrocarbon Content
- Polymer/Polymer Blend Identification
- Filler Types and Percents
- Specific Gravity
- Theoretical Formula Reconstruction
- Total Sulfur Content
- Wax Content
- Hardness

Example:
Reconstructed Formulation

Ingredient	PHR	Extract.	Ash	Volume
Polyisoprene Rubber	80.0	0.8		86.0
Styrene-Butadiene Rubber	20.0	0.2		21.3
Carbon Black (N300 Series)	44.8			24.9
Silicon Dioxide	15.2		14.6	7.6
Zinc Oxide	3.0		3.0	0.5
Hydrocarbon Oil	7.2	7.2		8.0
Stearic Acid	1.0	1.0		1.1
Santoflex 6PPD	2.5	2.5		2.5
Hydrocarbon Wax (C19-C37)	2.0	2.0		2.3
Misc. Extractables*	0.5	0.5		0.6
Sulfenamide (TBBS)	1.0	0.3		0.7
Santogard PVI	0.3	0.1		0.2
Sulfur	1.9			0.9
Totals	**179.4**	**14.6**	**17.6**	**156.6**

Calculated Ash Content	9.8%
Calculated Extractables	8.1%
Calculated Carbon Black	25.0%
Calculated Density (Mg/m³)	1.145

**Comments: It may contain rosin acids, accelerator fragments and other reaction products, etc.*

Note: Reconstructed formulation is based on analytical data from your sample. The above calculated percentages are based on the reconstructed formulation.

To further enhance and more exactly match an unknown material, the following tests can be performed at an additional charge:

- Acrylonitrile Content
- Antioxidant/Antiozonant Quantification
- Carbon Black Typing
- Free Sulfur Content
- Fiber Identification
- Halogen Content Analysis
- Pyrolysis GC/MS
- Resin Identification
- Thermal Analysis (DSC, DMA, TMA and TGA)
- Formula Compliance
- Regulatory Screening
- Quality Control
- Failure Analysis
- Off-Gassing

Sample Submittal Form

SAMPLE SUBMITTAL/ TESTING REQUEST FORM

AKRON RUBBER DEVELOPMENT LABORATORY, INC.

Date: _____/_____/_____

Shipping Method: ☐ Fed Ex ☐ UPS ☐ DHL ☐ USPS ☐ Hand Deliver ☐ Other_____

Please ship samples to:

2887 Gilchrist Rd.
Akron, OH 44305

(Main Laboratory - Send samples to this address unless you are instructed to send them to the address below)

or

75 Robinson Ave.
Barberton, OH 44203

Attention:

☐ Chemical Testing ☐ Microscopy
☐ Engineering ☐ Mixing/Molding
☐ Latex ☐ Physical Testing
☐ Legal/Forensics ☐ Plastics Testing

Contact Name *(if known)*:_____

PLEASE NOTE — DOMESTIC ORDERS (US & CANADA): ***PURCHASE ORDER IS REQUIRED TO BEGIN TESTING.*** OUTSIDE OF THE US & CANADA: ***ADVANCED PAYMENT IS REQUIRED TO BEGIN TESTING.*** PLEASE CONTACT 330-434-6665 OR WORLDWIDE 330-794-6600 FOR INFORMATION ON ACCEPTED METHODS.

Name		Title	
Company			**PO# *(Required)***
Address			
City	State	Zip Code	Country
Billing Address *(If Different From Above)*			
City	State	Zip Code	Country
Phone		Fax	
Email Address			
Sample Description			
Test Required and/or Description of Problem (Briefly State Reason)			

PLEASE USE THIS FORM TO SUBMIT YOUR SAMPLES AND/OR REQUESTS FOR TESTING

2887 Gilchrist Rd. • Akron, Ohio 44305 • answers@ardl.com
Toll Free (866) 778-ARDL • Worldwide 330-794-6600 • Fax (330) 794-6610