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 compound, can aid you in:

- Assuring the quality of ingredients in your compound
- 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 work to identify the root cause of failure, regardless of its origin, and will assist you in rectifying the problem.

Contact Us Today

Whether you need a single test method or a full program of tests and consultation to perfect your product, we're here to help and can provide you with a quote that's customized to your needs.

Contact Us Today

1 (866) 778-ARDL (2735)
ww.ardl.com

Example:

Typical Rubber Compound Analysis & Carbon Black Typing

COMPOUND ANALYSIS

Date:	January 10, 2018
Attention:	Ms. Maryann Jones
Company:	XYZ Corporation

Sample I.D.:	Competitor's Rubber
Sample Color:	Black
Project No:	123456

A. Polymer Identification; ASTM D3677
(Infrared Spectroscopy) **Percent of RHC**
1. *Polyisoprene Rubber* 80
2. *Styrene-Butadiene Rubber* 20
3.

B. Ash Content; ASTM D297 ..... *9.8%*

C. Semi-Quantitative Ash Analysis
(ICP Atomic Absorption or 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, Te, Na, Fe, Ni, Cu, Se, Sb, Ba, Pb*

D. Total RHC, ASTM D297 ..... *55.5%*

E. Total Sulfur, Leco Method *1.62%*

F. Density, Mg/m³ *1.138*

G. Wax Content ..... *Present*

H. Extractables, ASTM D297
Acetone Extractables, % *8.1%*
1. Color ..... *Amber*
2. Consistency ..... *Semi-Solid*

I. Carbon Black, ASTM D297
Carbon Black *25.0%*
1. ASTM Series Black *N300*

J. Extract Analysis
1. Plasticizers; ASTM D2702
a. *Hydrocarbon Oil*
b.
c.
2. Antioxidants; ASTM D3156
a. *Santoflex 6PPD*
b.
c.
3. Accelerators (Suggested)
a. *Sulfenamide (TBBS)*
b. *Santogard PVI*
c.

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

L. Microhardness, ASTM D1415
IRHD *61*

What information will a chemical analysis provide?

- Accelerators – Qualitative Only
- Antioxidant Identification
- Carbon Black Content
- Halogen Presence
- Percent Ash
- Percent Total Extract
- Plasticizer Identification
- Polymer/Polymer Blend Identification
- Rubber Hydrocarbon Content
- Semi-Quantitative Ash Analysis *(Filler Types and Percents)*
- Specific Gravity
- Theoretical Formula Reconstruction
- Total Sulfur Content

Example:

Reconstructed Formulation

RECONSTRUCTED FORMULATION

Ingredient	PHR	Extractables	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/m^3)..... *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)*
- Wax Content

Order Form

Please Provide Sample Description (10 Grams Preferred): _____

_____

_____

Please Indicate Tests To Be Performed:

☐	**Standard Analysis**	$900.00
☐	**Complete Analysis (Extract Analysis)**	$2,200.00

	Optional Tests	Individual Prices	Standard Analysis	Complete Analysis
☐	% ACN (In Total Sample)	$150.00	$150.00	$150.00
☐	% Ash	$150.00	Included	Included
☐	Beilstein (Cl or Br)	$55.00	Included	Included
☐	% Carbon Black	$250.00	Included	Included
☐	Carbon Black Typing	$500.00	$500.00	$500.00
☐	Density	$55.00	Included	Included
☐	DSC Analysis	$450.00	$450.00	$450.00
☐	% Extractables	$150.00	Included	Included
☐	Free Sulfur Content	$250.00	$250.00	$250.00
☐	Plasticizer ID	Consult Lab	Consult Lab	Consult Lab
☐	GC/MS - Qualitative*	$475.00	$475.00	Included
☐	GC/MS - Quantitative	Consult Lab	Consult Lab	Consult Lab
☐	Halogen Content	$350.00	$350.00	$350.00
☐	Polymer Identification	$200.00	Included	Included
☐	Pyrolysis GC/MS	$375.00	$375.00	$375.00
☐	Qualitative Accelerator Analysis	$850.00	$850.00	Included
☐	Resin ID	$475.00	$475.00	Included
☐	% Rubber Hydrocarbon	$450.00	Included	Included
☐	Semi-Quantitative Ash Analysis	$300.00	Included	Included
☐	TGA Analysis	$300.00	$300.00	$300.00
☐	Total Sulfur	$150.00	Included	Included
☐	Wax Content	$225.00	$225.00	$225.00
	**GC/MS - Qualitative Analysis includes plasticizer, antioxidant, antiozonant and additional processing aid identifications.*			
	General Prices - Pricing May Be Different Based on Sample Type and Testing Specific Details.			
	Total Price of Requested Testing	$_____	$_____	$_____

TERMS: DOMESTIC ORDERS (US & CANADA): PURCHASE ORDER IS REQUIRED TO BEGIN TESTING. NET 30, FOB AKRON
OUTSIDE OF THE US & CANADA: PRE PAYMENT IN FULL IS REQUIRED TO BEGIN TESTING.
Prices Subject to Change Without Notice.

WARRANTY: All work proposed is on the basis of our best effort using good judgement and established standard laboratory practices and procedures where applicable. All work will be performed promptly and professionally. We offer no other warranties, written or implied.

ARDL
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