



## ACUDYNE™ SCP Hair Styling Conditioning Polymer

### Description

#### THE CHALLENGE...

In today's hair styling products, there is a trade-off between good hold and great feel. Current ingredients offer strong hold, but do not impart a natural feel, often causing dullness and noticeably increased flaking.

#### THE SOLUTION...

#### Introducing ACUDYNE SCP – Styling Conditioning Polymer

Developed specifically for high-performance hair styling products, ACUDYNE SCP delivers:

<b>Tunable Hold</b>	Get the hold you want - from <b>soft</b> to <b>strong</b> .
<b>Conditioned Feel</b>	Unique conditioning polymers leave hair feeling natural and soft to the touch.
<b>Shine</b>	Incorporate shine to the hair without additives.
<b>High Humidity Style Retention</b>	Superior style retention even at high humidity levels.
<b>Non-flaking</b>	Critical non-flaking properties.
<b>Non-sticky Style</b>	Great style control without stickiness on wet or dry hair.

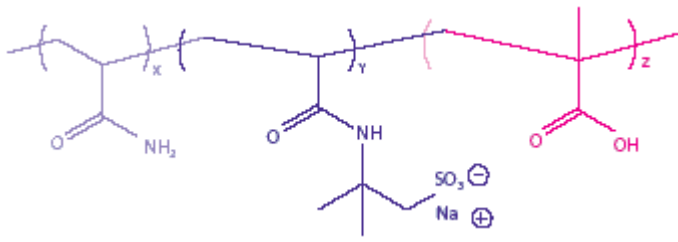
### Features and Mechanism

ACUDYNE SCP is a novel anionic polymer for hair gels, mousses, lotions, puttys, and pomades. Supplied as a pre-neutralized aqueous solution, ACUDYNE SCP enables firm hold, conditioned hair feel, superior humidity resistance — and all without flaking.

<b>Benefit</b>	<b>Enabling Mechanism</b>
Tunable Hold	Anionic polymer chemistry designed to hydrogen bond and adhere to the hair fiber. This combined with dual Tg, (glass transition temperature), gives firm hold to the hair.
Conditioned Feel on Hair	Designed so that slight hydration provides a conditioned feel. Enables a simpler formula with better clarity.
Shine	Simple formula means less buildup on the hair to detract from shine, and uniform film enhances hair shine.
Non-flaking	Self plasticized polymer eliminates flaking.
Formulation Compatibility (Blend partners)	Compatible with ACULYN™ and Carbopol™ rheology modifiers. Compatible with selected cationic additives, PVP, PVP/VA.

### Chemical and Physical Properties

ACUDYNE SCP is a linear anionic terpolymer of acrylamide, acrylamidomethyl propanesulfonic acid (sodium salt), and methacrylic acid. It is supplied pre-neutralized and is water soluble. It is manufactured as a low viscosity solution in water. It is easy to formulate into liquids or gels without any further neutralization.



## Film Properties

The ACUDYNE SCP polymer has two glass transition temperatures ( $T_g$ ), caused by hydration of the polymer film (Figure 1). This duality imparts a self-plasticizing characteristic. The plasticized phase eliminates flaking, and the non-plasticized phase maintains hold under high humidity conditions.

Figure 2 shows that the ACUDYNE SCP film has a significantly higher resistance to deform (modulus value) versus a PVP film at 55% relative humidity. This indicates a more humidity resistant film when exposed to humidity.

**Acudyne™ SCP's Unique DUAL Glass Transition Temperatures at Different Relative Humidities vs. PVP**

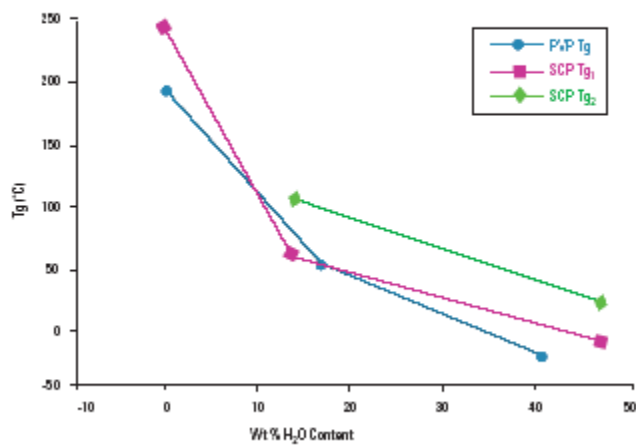


Figure 1

**Acudyne™ SCP Film is Stiffer than PVP at 55% Relative Humidity**

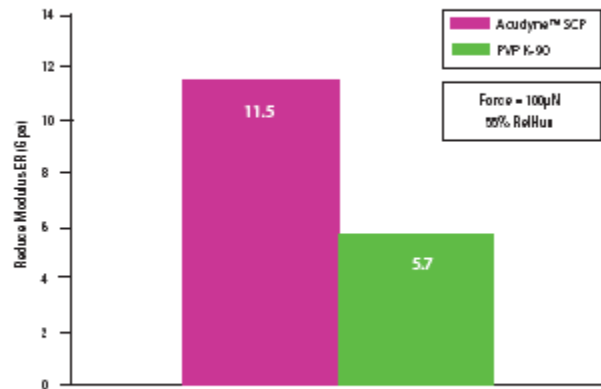


Figure 2

## Physical Description

These properties are typical but do not constitute specifications.

Tradename:	ACUDYNE SCP polymer
INCI Name:	Acrylamide/Sodium Acryloyldimethyltaurate/Acrylic Acid Copolymer
Appearance:	Clear colorless liquid
Solids:	25 - 27% in water
Molecular Weight (Mw): (Wgt. Avg.)	~ 250,000
Preservative:	0.2% Sodium Methylparaben

## Hair Gel Application Data

### High Humidity and Style Retention

Hair treated with ACUDYNE SCP gel shows excellent humidity resistance versus commercial hair fixative resins and commercially available hair gels.

#### Acudyne™ SCP has Excellent Humidity Resistance



**Time = 0**

<u>Left Side</u>	<u>Right Side</u>
Acudyne™ SCP Gel	PVP Based Commercial Gel



**Time = 4 hr @90%  
Relative Humidity**

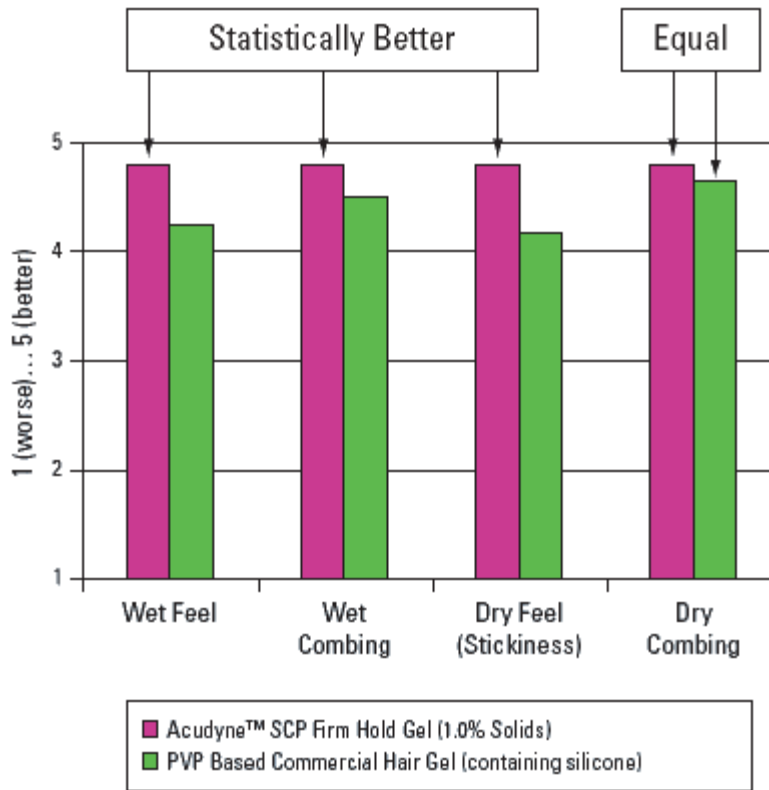
<u>Left Side</u>	<u>Right Side</u>
Acudyne™ SCP Gel	PVP Based Commercial Gel

### Distinctive Hair Aesthetics

### Superior Styling and Conditioned Feel

Salon tests demonstrate that ACUDYNE SCP delivers superior wet feel and combing versus a PVP-based commercial gel. Hair treated with the ACUDYNE SCP gel is also less sticky than with the PVP-based commercial gel.

### Acudyne™ SCP Delivers Superior Wet Feel, Combing and Dry Feel



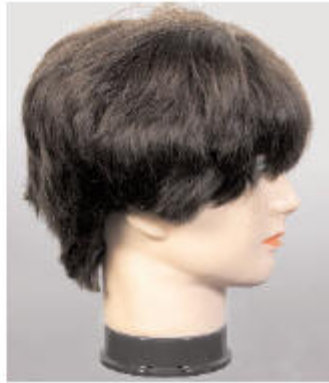
### Shine

Scanning electron microscope pictures illustrate a simple hair gel with ACUDYNE SCP provides the smoothest coating to the hair shaft when compared to both the PVP-based gels, and equivalent performance vs. a polyquat-based commercial gel. There is no flaking, and no detracting from shine.

**Improved Shine for Hair Treated  
with Acudyne™ SCP Gel**

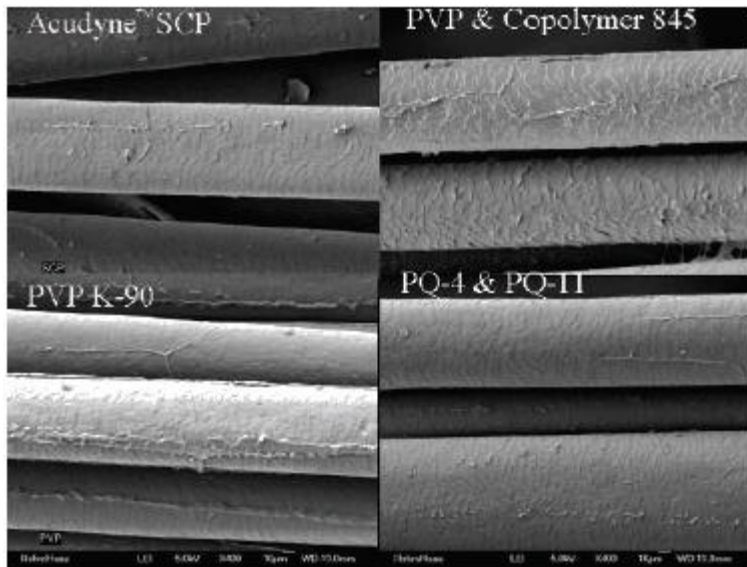


Acudyne™ SCP hair gel  
(1% solids).



Untreated hair.

**Acudyne™ SCP Provides Smoothest  
Coating on Hair Shaft**



**Scanning Electron Microscopy Pictures**

Non-flaking

ACUDYNE SCP does not flake on the hair, even without plasticizer in the formulation.

## Acudyne™ SCP Does Not Flake on the Hair



**Acudyne™ SCP  
Hair Gel**



**PVP Based  
Commercial Gel**

*Hair tresses were treated, dried, and combed through 5 times prior to optical microscopy.*

### Salon Evaluation

ACUDYNE SCP Gel (Ultra-Stiff Hair Gel) vs. Leading Commercial Styling Gel)

#### Test Conditions

Half-head salon studies were conducted on eleven female subjects at CRL Labs, New Jersey, USA.

#### Test Method

Pre-test evaluation included assessments of the type, texture and length of the hair, pre-treatment of the hair and the condition of the hair and scalp. The cosmetologist then shampooed the hair with a clarifying shampoo. The hair was then parted in the middle to define the two test sites after which the gels were applied to the hair in accordance with computer generated randomization. During application, the cosmetologist evaluated the parameters for wet evaluation, which included ease of product spreading, product consistency, wet feel, wet combing/force to comb, coating/residue, tackiness and styling ease. After completing the application and wet evaluations for both sides of the head, the cosmetologist dried and styled the hair. Cosmetologist evaluated the dry parameters, which included shine, combability, dust flaking, stiffness of film, degree of tackiness, body/manageability, volume/fullness, and overall appearance. Further, the subjects were given a take home questionnaire to evaluate the hold properties of each test material four to six hours post-treatment.

### Results

#### Wet Evaluation on Hair

ACUDYNE SCP Gel was rated better than the Commercial Styling Gel for:

- ease of product spreading
- product consistency
- wet feel
- ease of combing
- lower coating/residue
- tackiness
- styling ease

#### Dry Evaluation on Hair

ACUDYNE SCP Gel was rated better than the Commercial Styling Gel for:

- shine on hair
- tackiness
- flaking
- stiffness of film
- ease of combing
- body/manageability
- volume/fullness
- overall appearance

## Salon Test Formulation

### Firm Hold Hair Gel

Trade Name	% Wt.	CTFA / INCI Name	Supplier
Water	91.9	Water	
Tween 20	0.20	Polysorbate 20	Uniquema
Carbopol Ultrez 21	1.0	Acrylates/C10-30 Alkyl Acrylates Crosspolymer	Noveon
ACUDYNE SCP (25% solids)	4.0	Acrylamide/Sodium Acryloyldimethyltaurate/ Acrylic Acid Copolymer	Rohm and Haas
Tealan 99%	1.5	Triethanolamine	RITA
PVP/VA W-635 (50%)	1.0	PVP/VA	ISP
Preservative	q.s. to 100		

### Processing Instructions:

1. Blend surfactant, preservatives, and Ultrez 21 with water and mix.
2. Add ACUDYNE SCP into the well dispersed mixture and stir.
3. Gradually add the neutralizer (TEA) and mix until a clear gel is formed.
4. Add the PVP/VA solution into the clear gel and mix.

Parameter	Measured Property	Method
Viscosity	20,000 cps	Brookfield RV Viscometer, Spindle #6, 20 rpm
pH	7.10	pH meter
Appearance	Clear	Visual

### Formulations and Procedure - Hair Gel

#### Moderate Firm Hold Hair Gel

Trade Name	% Wt.	CTFA / INCI Name	Supplier
Water	92.3	Water	
Tween 20	0.10	Polysorbate 20	Uniqema
Carbopol 940	1.0	Carbomer	Noveon
ACUDYNE SCP (25% solids)	4.0	Acrylamide/Sodium Acryloyldimethyltaurate/ Acrylic Acid Copolymer	Rohm and Haas
Tealan 99%	1.5	Triethanolamine	RITA
Preservative	q.s. to 100		

### Processing Instructions:

1. Blend surfactant, preservative, fragrance (optional), and Carbomer with water and mix.
2. Add ACUDYNE SCP into the Carbomer solution and stir.
3. Gradually add neutralizer and mix until clear gel is formed.

Parameter	Measured Property	Method
Viscosity	16,000 cps	Brookfield RV viscometer, Spindle #6, 20 rpm
pH	7.10	pH meter
Appearance	Clear	Visual

#### Extra Firm Hold Hair Gel

##### Phase A

Trade Name	% Wt.	CTFA / INCI Name	Supplier
Water	30.26	Water	
Carbopol 940 (2% solution in water)	30.00	Carbomer	Noveon
PVP K-90 (20%)	10.00	PVP	ISP

##### Phase B

Water	28.00	Water	
ACUDYNE SCP (25%)	1.00	Acrylamide/Sodium Acryloyldimethyltaurate/ Acrylic Acid Copolymer	Rohm and Haas
Preservative	q.s. to 100		

##### Phase C

AMP-95	0.63	Aminomethylpropanol	Dow
--------	------	---------------------	-----

#### Processing Instructions:

1. Add the pre-dissolved Carbomer solution to Phase A water and stir.
2. Add PVP K-90 solution and stir.
3. In a separate vessel, combine ACUDYNE SCP to the Phase B water, and stir until the mixture is uniform.
4. Add the Phase B solution to the Phase A solution with mixing. Add the preservative and then slowly add Phase C, the AMP-95, to the mixture with stirring.

Parameter	Measured Property	Method
Viscosity	14,000 - 16,000 cps	Brookfield RV viscometer, Spindle #6, 20 rpm
pH	7 - 7.8	pH meter
Appearance	Clear	Visual

#### Ultra Firm Hold Hair Gel

##### Phase A

Trade Name	% Wt.	CTFA / INCI Name	Supplier
Water	42.29	Water	
Brij 98	0.10	Oleth-20	Uniqema
ACULYN™ 33 (28%)	1.00	Acrylates Copolymer	Rohm and Haas



ACULYN 28 (20%)	5.00	Acrylates/Beheneth-25 Methacrylate Copolymer	Rohm and Haas
PVP K-90 (20%)	5.00	PVP	ISP

### Phase B

Preservative	q.s. to 100		
Water	45.00	Water	
ACUDYNE SCP (25%)	1.00	Acrylamide/Sodium Acryloyldimethyltaurate/Acrylic Copolymer	Rohm and Haas
AMP-95	0.50	Aminomethylpropanol	Dow

### Processing Instructions:

1. Completely dissolve Brij 98 into the Phase A water, followed by addition of ACULYN 33, followed by ACULYN 28 and PVP, with stirring.
2. In a separate vessel, add ACUDYNE SCP to the Phase B water and stir.
3. Add AMP-95 to Phase B and stir.
4. Add the ACUDYNE SCP solution to the Phase A solution and mix.

Parameter	Measured Property	Method
Viscosity	20,000 cps	Brookfield RV viscometer, Spindle #6, 20 rpm
pH	7.2 - 7.5	pH meter
Appearance	Clear	Visual

### 6% VOC Firm Hold Alcohol Containing Gel

Trade Name	% Wt.	CTFA / INCI Name	Supplier
Water	86.3	Water	
Ethanol (200 proof)	6.0	Alcohol	Pharmaco
Tween 20	0.10	Polysorbate 20	Uniqema
Carbopol Ultrez 21	1.0	Acrylates/C10-30 Alkyl Acrylates Crosspolymer	Noveon
ACUDYNE SCP (25% solids)	4.0	Acrylamide/Sodium Acryloyldimethyltaurate/Acrylic Acid Copolymer	Rohm and Haas
Tealen 99%	1.5	Triethanolamine	
Preservative	q.s. to 100		

### Processing Instructions:

1. Blend surfactant, preservatives, and Carbomer with water and alcohol and mix.
2. Add ACUDYNE SCP into the Carbomer solution and mix.
3. Gradually add the neutralizer and agitate until a clear gel is formed.

Parameter	Measured Property	Method
Viscosity	14,000 - 16,000 cps	Brookfield RV viscometer, Spindle #6, 20 rpm
pH	6.9	pH meter
Appearance	Clear	Visual

#### 6% VOC Aerosol Mousse

Trade Name	% Wt.	CTFA / INCI Name	Supplier
Water	82.075	Water	
ACUDYNE SCP (25.0%)	8.0	Acrylamide/Sodium Acryloyldimethyltaurate/ Acrylic Acid Copolymer	Rohm and Haas
Amphosol HCG	0.5	Cocoamidopropyl Betaine	Stepan
Procol LA-23	0.125	Laureth-23	Protameen
Ceraphyl 65	0.1	Propylene Glycol (and) Quaternium-26	ISP
Incromectant LAMEA	0.1	Acetamide MEA (and) Lactamide MEA	Croda
Neolone™ 950	0.1	Methylisothiazolinone	Rohm and Haas
Isobutane *	5.0	Isobutane	Airgas
Propane *	1.0	Propane	Airgas
Dymel HFC-152a	3.0	Hydrofluorocarbon 152a	DuPont

\* Substituted for Propellant A-46.

#### Processing Instructions:

1. Blend ACUDYNE SCP with the water, slowly add in remaining non-propellant ingredients with stirring.
2. Pour mixture into an aluminum can, place valve on top, crimp. Charge with propellants.

Parameter	Range	Method
Viscosity	12 - 20 cps	Brookfield LVT viscometer, Spindle #1, 20 rpm
pH	6.0 - 6.5	pH meter
Appearance	Clear	Visual

#### Alcohol Free Mousse

Trade Name	% Wt. M17	CTFA / INCI Name	Supplier
Water	85.55	Water	
ACUDYNE SCP (25.0%)	8.0	Acrylamide/Sodium Acryloyldimethyltaurate/ Acrylic Acid Copolymer	Rohm and Haas
Tealan 99%	0.15	Triethanolamine	RITA
Tween 20	0.5	Polysorbate 20	Uniqema
Amphosol HCG	5.0	Cocoamidopropylbetaine	Stepan
Preservative	q.s. to 100		

#### Processing Instructions:

1. Blend half the water with ACUDYNE SCP, then add the Tealan.

2. Subsequently add remaining water, with stirring, in the order listed above.

Parameter	Range	Method
Viscosity	6 - 12 cps	Brookfield LVT viscometer, Spindle #1, 20 rpm
pH	6.5 - 7.0	pH meter
Appearance	Clear	Visual

### Formulations and Procedures - Setting Cream

#### Phase A

Trade Name	% Wt.	CTFA / INCI Name	Supplier
Water	66.9	Water	

#### Phase B

Stearyl Alcohol	2.5	Stearyl Alcohol	Stepan
Brij 78	4.0	Steareth-20	Uniqema
Petrolan USP Ultra White	6.0	Petrolatum	RITA
White Ozokerite Wax	3.0	Ozokerite Wax	Strahl & Pitsch Inc.
Arlacel 165	2.0	Glyceryl Stearate and PEG 100 Stearate	Stepan
Drakeol 7LT	5.0	Mineral Oil	Penreco
Octyl Isononanoate	1.5	Ethylhexyl Isononanoate	Stepan
Tagat CH 40	1.5	PEG-40 Hydrogenated Castor Oil	Degussa
Glycerin	1.5	Glycerin	RITA
Procetyl AWS	1.0	PPG-5-Ceteth-20	Croda
ACUDYNE SCP (25%)	4.0	Acrylamide/Sodium Acryloyldimethyltaurate/Acrylic Acid Copolymer	Rohm and Haas

#### Phase C

Preservative	q.s. to 100		
--------------	-------------	--	--

#### Processing Instructions:

1. Heat Phase A water to 70°C.
2. Heat Phase B ingredients to 80°C and mix.
3. Add Phase B ingredients to Phase A.
4. Add ACUDYNE SCP. Mix 15 minutes.
5. Air cool to 40°C while mixing at 500 rpm. Add preservative and mix thoroughly for 5 minutes.
6. Add color or fragrance as preferred.

## Formulations and Procedures - Styling Putty

### Phase A

Trade Name	% Wt.	CTFA / INCI Name	Supplier
Water	67.4	Water	

### Phase B

Stearyl Alcohol	5.0	Stearyl Alcohol	Stepan
Brij 78	4.0	Steareth-20	Uniqema
Petrolan USP Ultra White	4.0	Petrolatum	RITA
White Ozokerite Wax	3.0	Ozokerite Wax	Strahl & Pitsch Inc.
Arlacel 165	3.0	Glyceryl Stearate and PEG 100 Stearate	Stepan
Drakeol 7LT	3.0	Mineral Oil	Penreco
Octyl Isononanoate	1.5	Ethylhexyl Isononanoate	Stepan
Tagat CH 40	1.5	PEG-40 Hydrogenated Castor Oil	Degussa
Glycerin	1.5	Glycerin	RITA
Procetyl AWS	1.0	PPG-5 Ceteth-20	Croda
ACUDYNE SCP (25%)	4.0	Acrylamide/Sodium Acryloyldimethyltaurate/ Acrylic Acid Copolymer	Rohm and Haas

### Phase C

Preservative	q.s. to 100		
--------------	-------------	--	--

### Processing Instructions:

1. Heat Phase A to 70°C.
2. Mix Phase B ingredients and heat to 80°C and mix.
3. Add Phase B ingredients to Phase A.
4. Add ACUDYNE SCP. Mix for 15 minutes.
5. Air cool to 40°C while mixing. Add preservative and mix thoroughly for 15 minutes.
6. Add color or fragrance as preferred.

### Health and Safety Profile

The ACUDYNE SCP polymer was tested in a number of non-clinical and clinical tests to evaluate potential hazards associated with handling and use of the material in personal care applications.

### Overall Evaluation

ACUDYNE SCP was non-toxic by a single oral or dermal dose, produced minimal to slight irritation to the eyes and skin, was non-irritating and non-sensitizing in a human patch report, and was non-mutagenic in the Ames assay

This material is safe and appropriate for use in a broad range of personal care applications.

## Toxicity

### Acute Toxicity

Test/Species	Results
Oral LD <sub>50</sub> — rat	>5000 mg/kg
Dermal LD <sub>50</sub> — rat	>5000 mg/kg
Eye irritation — rabbit	Minimal irritant (US), Non-irritant (EEC)
Dermal irritation — rabbit	Slight irritant (US), Non-irritant (EEC)

US = US Environmental Protection Agency

EEC = European Economic Community

### Human Toxicity Profile

Test/Species	Results
HRIPT	Non-sensitizing and Non-irritating

### Genetic Toxicity Profile

Test/Species	Results
Ames Test	Not mutagenic with and without metabolic activation

## Storage and Handling

### Storage

ACUDYNE SCP is supplied as a 25% solids aqueous solution, with a maximum viscosity of 2000 cps at room temperature (25°C). ACUDYNE SCP is freeze/thaw stable.

### Material Safety Data Sheets

Rohm and Haas Material Safety Data Sheets (MSDS) contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products. Under the OSHA Hazard Communication Standard, workers must have access to and understand MSDS on all hazardous substances to which they are exposed. Thus, it is important that you provide appropriate training and information to your employees and make sure they have available to them MSDS on any hazardous product in the workplace.

We recommend that you obtain copies of the MSDS from your local Rohm and Haas technical representative or from the sales office nearest to you, before using our products in your facilities.

Upon initial shipment of non-OSHA-hazardous and OSHA-hazardous products (including samples), Rohm and Haas Company sends the appropriate MSDS to the recipient. If you do not have access to one of these MSDS, please contact your local Rohm and Haas representative for a copy. Updated MSDS are sent upon revision to all customers of record. MSDS are also sent annually to all customers receiving products deemed hazardous under the Superfund Amendments and Reauthorization Act (SARA). MSDS should be obtained from suppliers of other materials recommended in this bulletin.

Rohm and Haas Company is a member of the American Chemistry Council (ACC) and is committed to the ACC's Responsible Care® Program.

---

ACUDYNE and ACULYN are registered trademarks of the Rohm and Haas Company, or of its subsidiaries or affiliates. The Company's policy is to register its trademarks where products designated thereby are marketed by the Company, its subsidiaries or affiliates.

TWEEN, BRIJ are trademarks of Uniqema,  
Carbopol is a trademark of Noveon, Inc.,  
TEALAN, GLYCERIN, PETROLAN are trademarks of RITA,  
GERMABEN is a trademark of ISP Technologies, Inc.,  
Procetyl is a trademark of Croda Inc.,  
Tagat is a trademark of Degussa,  
Stepan, Amphosol are trademarks of Stepan Company,  
Drakeol is a trademark of Penreco,  
AMP is a registered trademark of Dow Chemical,  
Arlacel is a registered trademark of Stepan.

These suggestions and data are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use of our products are beyond our control. Rohm and Haas Company makes no warranties, either expressed or implied, as to the accuracy or appropriateness of this data. Rohm and Haas Company expressly disclaims any implied warranty or fitness for a particular use. We recommend that the prospective users determine for themselves the suitability of Rohm and Haas materials and suggestions for any use prior to their adoption.

Suggestions for uses of our products or the inclusion of descriptive material from patents and the citation of specific patents in this publication should not be understood as recommending the use of our products in violation of any patent or as permission or license to use any patent of the Rohm and Haas Company.



©Rohm and Haas, 2006 All rights reserved.

March 2005  
PC0012004\_EUR