

PATENT ASSIGNMENT

Electronic Version v1.1  
Stylesheet Version v1.1

| SUBMISSION TYPE:   | NEW ASSIGNMENT         |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
|--|------------------------|---------------|------------------------|---------------------|--------------------|---------------------|--------------|---------------------|--------------|---------------------|----------|---------------------|----------|---------------------|----------|---------------------|----------|---------------------|----------|---------------------|----------|---------------------|----------|
| NATURE OF CONVEYANCE:  | ASSIGNMENT             |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| CONVEYING PARTY DATA   |                        |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| <table border="1"><tr><td>Name</td><td>Execution Date</td></tr><tr><td>Sunoco, Inc. (R&amp;M)</td><td>01/01/2009</td></tr></table>   |                        | Name          | Execution Date         | Sunoco, Inc. (R&M)  | 01/01/2009         |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Name   | Execution Date         |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Sunoco, Inc. (R&M)   | 01/01/2009             |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| RECEIVING PARTY DATA   |                        |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| <table border="1"><tr><td>Name:</td><td>Sunoco Chemicals, Inc.</td></tr><tr><td>Street Address:</td><td>1735 Market Street</td></tr><tr><td>City:</td><td>Philadelphia</td></tr><tr><td>State/Country:</td><td>PENNSYLVANIA</td></tr><tr><td>Postal Code:</td><td>19103</td></tr></table>  |                        | Name:         | Sunoco Chemicals, Inc. | Street Address:     | 1735 Market Street | City:               | Philadelphia | State/Country:      | PENNSYLVANIA | Postal Code:        | 19103    |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Name:  | Sunoco Chemicals, Inc. |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Street Address:  | 1735 Market Street     |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| City:  | Philadelphia           |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| State/Country:   | PENNSYLVANIA           |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Postal Code:   | 19103                  |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| PROPERTY NUMBERS Total: 10   |                        |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| <table border="1"><thead><tr><th>Property Type</th><th>Number</th></tr></thead><tbody><tr><td>Application Number:</td><td>09865190</td></tr><tr><td>Application Number:</td><td>10844640</td></tr><tr><td>Application Number:</td><td>11090523</td></tr><tr><td>Application Number:</td><td>11110006</td></tr><tr><td>Application Number:</td><td>11715686</td></tr><tr><td>Application Number:</td><td>11796887</td></tr><tr><td>Application Number:</td><td>11998583</td></tr><tr><td>Application Number:</td><td>12286773</td></tr><tr><td>Application Number:</td><td>12286774</td></tr><tr><td>Application Number:</td><td>12286834</td></tr></tbody></table> |                        | Property Type | Number                 | Application Number: | 09865190           | Application Number: | 10844640     | Application Number: | 11090523     | Application Number: | 11110006 | Application Number: | 11715686 | Application Number: | 11796887 | Application Number: | 11998583 | Application Number: | 12286773 | Application Number: | 12286774 | Application Number: | 12286834 |
| Property Type  | Number                 |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Application Number:  | 09865190               |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Application Number:  | 10844640               |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Application Number:  | 11090523               |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Application Number:  | 11110006               |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Application Number:  | 11715686               |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Application Number:  | 11796887               |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Application Number:  | 11998583               |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Application Number:  | 12286773               |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Application Number:  | 12286774               |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| Application Number:  | 12286834               |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
| CORRESPONDENCE DATA  |                        |               |                        |                     |                    |                     |              |                     |              |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |                     |          |
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CH \$400.00 09865190

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PATENT  
REEL: 023544 FRAME: 0271

|                     |  |
|---------------------|--|
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| Address Line 4:     | Philadelphia, PENNSYLVANIA 19103-4196  |

|                         |             |
|-------------------------|-------------|
| ATTORNEY DOCKET NUMBER: | E9427-00000 |
|-------------------------|-------------|

|                    |                    |
|--------------------|--------------------|
| NAME OF SUBMITTER: | Richard A. Paikoff |
|--------------------|--------------------|

|   |
|---|
| <p>Total Attachments: 14</p> <p>source=Assignment#page1.tif</p> <p>source=Assignment#page2.tif</p> <p>source=Assignment#page3.tif</p> <p>source=Assignment#page4.tif</p> <p>source=Assignment#page5.tif</p> <p>source=Assignment#page6.tif</p> <p>source=Assignment#page7.tif</p> <p>source=Assignment#page8.tif</p> <p>source=Assignment#page9.tif</p> <p>source=Assignment#page10.tif</p> <p>source=Assignment#page11.tif</p> <p>source=Assignment#page12.tif</p> <p>source=Assignment#page13.tif</p> <p>source=Assignment#page14.tif</p> |
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## **TRANSFER AND ASSIGNMENT OF INTELLECTUAL PROPERTY RIGHTS**

This TRANSFER AND ASSIGNMENT OF INTELLECTUAL PROPERTY RIGHTS (this "Assignment"), dated as of January 1, 2009, is entered into by and between SUNOCO, INC (R&M), a Pennsylvania corporation ("Assignor") and SUNOCO CHEMICALS, INC., a Delaware corporation ("Assignee").

A. Assignor and Assignee have entered into a Simplification and Restructuring Agreement dated as of January 1, 2009 (the "Simplification Agreement"), providing for the contribution and transfer by the Assignor to Assignee of the Contributed R&M Chemicals Assets. Capitalized terms not otherwise defined herein have the meaning ascribed to such terms in the Simplification Agreement.

B. The Intellectual Property Rights to be assigned to Assignee form part of the Contributed R&M Assets and include, without limitation, the patents ("**Patents**") set forth in **Schedule 1**, the trademarks, copyrights, trade names, service marks and registrations and applications for any of the foregoing (together with the goodwill associated with such trade names, trademarks and service marks), trade secrets, inventions, other proprietary information and licenses from third persons granting the right to use any of the foregoing used exclusively in the Chemicals Business, but expressly excluding any of the foregoing which are used by Sunoco, Inc. or Sunoco, Inc. R&M on a company-wide basis; and

C. For good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged by Assignor, Assignor desires to execute and deliver this Assignment for the purpose of effecting such assignment pursuant to the terms and conditions of the Simplification and Restructuring Agreement.

Now, therefore, intending to be legally bound, the parties hereby agree as follows:

### **AGREEMENT:**

1. Assignment of Intellectual Property Rights. In accordance with, and subject to the terms and conditions set forth in, the Simplification Agreement, Assignor hereby sells, assigns, transfers, conveys and delivers to Assignee all of its right, title and interest in and to the Intellectual Property Rights, including, without limitation, the following: (a) Assignor's right to apply for and maintain all national and foreign registrations, renewals and extensions relating to the Patents; (b) any contractual rights of Assignor related to the Intellectual Property Rights; (c) all of Assignor's benefits, privileges, causes of action and remedies relating to the foregoing, whether heretofore accrued or hereafter accruing; and (d) Assignor's right to sue for all past, present and future infringements or other violations of rights relating to the Intellectual Property Rights and to settle and retain proceeds from any such actions.

2. Discontinuation of Use. As soon as practicable after the date hereof, except as otherwise specified in the Simplification Agreement or any collateral agreement between the parties, Assignor will immediately discontinue use of the Intellectual Property Rights. Assignor will not take any action to limit or interfere with, in any manner, Assignee's ownership of and rights with respect to the Intellectual Property Rights.

3. Registration of Transfer; Further Assurances. Immediately following execution of this Assignment, and subject to the terms of the Simplification Agreement, Assignor will take all necessary steps to register the transfer of the Patents to Assignee or its designee by filing a copy of this Assignment with the United States Patent and Trademark Office and any foreign patent and trademark or similar authority all reasonably necessary forms and other documents. Assignor and Assignee agree to cooperate with each other to execute and deliver such other documents and instruments and to do such further acts and things as may be reasonably requested by the other to evidence, document or carry out the provisions of this Assignment or to further the purposes hereof.

4. Miscellaneous. This Assignment shall be construed, interpreted and the rights of the parties determined in accordance with the laws of the Commonwealth of Pennsylvania, without regard to the conflict of law principles thereof. This Assignment may be executed in two or more counterparts, each of which shall be deemed to be an original, but all of which together shall constitute one and the same document.

5. No Modification of Simplification Agreement. Notwithstanding any other provision of this Assignment to the contrary, nothing contained in this Assignment in any way supersedes, modifies, replaces, amends, changes, rescinds, waives, exceeds, expands, enlarges or in any way affects the Simplification and Restructuring Agreement. This Assignment is intended only to effectuate the transfer of certain property transferred pursuant to the Contribution Agreement and will be governed entirely in accordance with the terms and conditions of the Contribution Agreement.

[SIGNATURES ON FOLLOWING PAGE]

IN WITNESS WHEREOF, the parties hereto have caused this Assignment and Transfer of Intellectual Property Rights to be signed by duly authorized officers or representatives as of the date first set forth above.

**ASSIGNOR:**

**SUNOCO, INC. (R&M)**

By: 

Name: Bruce G. Fischer

Title: Senior Vice President  
Strategy and Portfolio

**ASSIGNEE:**

**SUNOCO CHEMICALS, INC.**

By: 

Name: Bruce D. Rubin

Title: Vice President

**SCHEDULE 1**  
**PATENTS**

## POLYPROPYLENE PATENTS

### Invention: Polypropylene Composition For Producing Clear Thermoformed Parts

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 6,387,317                       | US      | Granted | 20-JAN-2020        |
| (2,397,864)                     | Canada  | Allowed |                    |

### Invention: Polypropylene Impact Copolymer Having Bimodal Sized Rubber Particles

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 6,576,709                       | US      | Granted | 25-MAR-2021        |

### Invention: Polypropylene Film Having Good Drawability In A Wide Temperature Range And Film Properties

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 6,596,814                       | US      | Granted | 28-NOV-2021        |

### Invention: Polypropylene Materials With High Melt Flow Rate and Good Molding Characteristics and Methods of Making

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 6,599,985                       | US      | Granted | 18-OCT-2021        |

### Invention: Polypropylene Impact Copolymer Having Bimodal Sized Rubber Particles

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 6,660,808                       | US      | Granted | 23-MAR-2021        |

### Invention: Polypropylene Biaxially Oriented Film

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 6,733,719                       | US      | Granted | 10-OCT-2022        |

### Invention: Resin Compositions For Producing Biaxially Oriented Polypropylene Films

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 6,733,898                       | US      | Granted | 27-AUG-2022        |

### Invention: Flexible Polyolefin Compounds for Vehicle Applications

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 6,953,541                       | US      | Granted | 8-MAY-2022         |

### Invention: Propylene Homopolymers for Biaxially Oriented Films

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 7,056,592                       | US      | Granted | 2-JUL-2024         |
| (2,544,729)                     | Canada  | Pending |                    |
| (PA/A/2006/005629)              | Mexico  | Pending |                    |

**Invention: Paintable, In-Reactor Blended, Thermoplastic Polyolefin**

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| 7,217,768                       | US      | Granted | 10-AUG-2025     |

**Invention: Process for Production of Propylene Homopolymers**

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| 7,217,772                       | US      | Granted | 25-MAR-2025     |
| (2,600,364)                     | Canada  | Pending |                 |
| (MX/A/2007/011776)              | Mexico  | Pending |                 |

**Invention: High Melt Flow Rate Thermoplastic Polyolefins Produced In-Reactor**

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| 7,226,977                       | US      | Granted | 17-MAR-2025     |
| (2,562,888)                     | Canada  | Pending |                 |
| 254455                          | Mexico  | Granted | 17-MAR-2025     |

**Invention: Resin Compositions For Producing Biaxially Oriented Polypropylene Films**

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| 7,282,539                       | US      | Granted | 13-JUN-2023     |

**Invention: Polypropylene Blends for Non-Woven Fabrics**

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| (10/844,640)                    | US      | Pending |                 |
| (2,563,984)                     | Canada  | Pending |                 |
| (PA/A/2006/013107)              | Mexico  | Pending |                 |

**Invention: Improved Clarity, Low Haze Polymer**

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| (10/855,922)                    | US      | Allowed |                 |
| (2,566,532)                     | Canada  | Pending |                 |
| (PA/A/2006/013760)              | Mexico  | Pending |                 |

**Invention: Process for the Production of Propylene Copolymers**

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| (11/090,523)                    | US      | Pending |                 |
| (2,600,362)                     | Canada  | Pending |                 |
| (MX/A/2007/011777)              | Mexico  | Pending |                 |

**Invention: In-Reactor Produced Polypropylene Blends**

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| (11/110,006)                    | US      | Pending |                 |
| (2,600,256)                     | Canada  | Pending |                 |
| (MX/A/2007/013166)              | Mexico  | Pending |                 |

**Invention: Resin Compositions For Producing Biaxially Oriented Polypropylene Films**

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| (11/715,686)                    | US      | Pending |                 |



**Invention: Impact Copolymers Having Improved Properties**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| (11/796,887)                    | US      | Pending |                    |

**Invention: High Crystallinity, High Melt Flow Rate Polypropylene**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| (11/809,114)                    | US      | Allowed |                    |
| 11/998,583                      | US      | Pending |                    |
| (PCT/US07/012868)               | PCT     | Pending |                    |

**Invention: Extensible Spunbond Non-Woven Fabrics**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 61/132,145                      | US      | Pending |                    |

**Invention: Film Comprising A Random Copolymer With Enhanced Ethylene Content**

| Patent No.<br>(Application No.) | Country | Status           | Expiration<br>Date |
|---------------------------------|---------|------------------|--------------------|
| t/b/a                           | US      | Filed 1-OCT-2008 |                    |

**Invention: Random Copolymer With Enhanced Ethylene Content**

| Patent No.<br>(Application No.) | Country | Status           | Expiration<br>Date |
|---------------------------------|---------|------------------|--------------------|
| t/b/a                           | US      | Filed 1-OCT-2008 |                    |

**Invention: Method For Preparing A Random Copolymer With Enhanced Ethylene Content**

| Patent No.<br>(Application No.) | Country | Status           | Expiration<br>Date |
|---------------------------------|---------|------------------|--------------------|
| t/b/a                           | US      | Filed 1-OCT-2008 |                    |

## **PHENOL PATENTS**

**Invention: Distillation Process for Recovery of High Purity Phenol (Assigned to "Sun Company Inc." from Allied Signal)**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 5,064,507                       | US      | Granted | 27-SEP-2010        |

**High Quality Phenol Rectification With Energy Recovery (Assigned to "Sun Company Inc." from Allied Signal)**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 5,131,984                       | US      | Granted | 23-SEP-2011        |

**Invention: Inhibiting Color Change in Cumene Hydroperoxide**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 5,202,498                       | US      | Granted | 20-APR-2012        |

**Invention: Removal of Acetophenone from Phenol Purification Residues (Assigned to "Sun Company Inc." from Allied Signal)**

| Patent No.<br>(Application No.) | Country               | Status  | Expiration<br>Date |
|---------------------------------|-----------------------|---------|--------------------|
| 5,240,568                       | US                    | Granted | 29-AUG-2011        |
| 0642487                         | EP                    | Granted |                    |
| 0642847                         | Belgium               | Granted | 28-AUG-2012        |
| 69215109                        | Germany               | Granted | 28-AUG-2012        |
| 106194                          | Finland               | Granted | 28-AUG-2012        |
| 0642847                         | France                | Granted | 28-AUG-2012        |
| 0642847                         | Italy                 | Granted | 28-AUG-2012        |
| 2106336                         | Russian<br>Federation | Granted | 28-AUG-2012        |
| 0642847                         | Spain                 | Granted | 28-AUG-2012        |

**Invention: Two-Stage Cleavage of Cumene Hydroperoxide**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 5,245,090                       | US      | Granted | 11-SEP-2012        |

**Invention: Recovery of Phenol from Low Concentrations with Sodium Sulfate**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 5,344,528                       | US      | Granted | 04-AUG-2013        |

Invention: Phenol with Low Levels of Methylbenzofuran (Assigned to "Sun Company Inc." from Allied Signal)

| Patent No.<br>(Application No.) | Country     | Status  | Expiration Date |
|---------------------------------|-------------|---------|-----------------|
| 5,414,154                       | US          | Granted | 06-JUN-2014     |
| ZL951934511                     | China       | Granted | 03-MAY-2015     |
| 0764146                         | EP          | Granted |                 |
| 0764146                         | France      | Granted | 03-MAY-2015     |
| 0764146                         | Germany     | Granted | 03-MAY-2015     |
| 0764146                         | Spain       | Granted | 03-MAY-2015     |
| 0764146                         | UK          | Granted | 03-MAY-2015     |
| 191201                          | India       | Granted | 28-APR-2015     |
| 2888260                         | Japan       | Granted | 03-MAY-2015     |
| 0365103                         | Korea       | Granted | 03-MAY-2015     |
| 2134681                         | Russian Fed | Granted | 03-MAY-2015     |
| 408105                          | Taiwan      | Granted | 11-MAY-2015     |

Invention: Improved Method for Production of Phenol and Acetone by Decomposition of Cumene Hydroperoxide

| Patent No.<br>(Application No.) | Country     | Status  | Expiration Date |
|---------------------------------|-------------|---------|-----------------|
| 6,201,157                       | US          | Granted | 10-JAN-2020     |
| ZL00819286.3                    | China       | Granted | 19-DEC-2020     |
| EP1248759                       | EP          | Granted |                 |
| EP1248759                       | Belgium     | Granted | 19-DEC-2020     |
| EP1248759                       | France      | Granted | 19-DEC-2020     |
| EP1248759                       | Germany     | Granted | 19-DEC-2020     |
| EP1248759                       | Italy       | Granted | 19-DEC-2020     |
| EP1248759                       | Netherlands | Granted | 19-DEC-2020     |
| EP1248759                       | Romania     | Granted | 19-DEC-2020     |
| EP1248759                       | Spain       | Granted | 19-DEC-2020     |
| EP1248759                       | UK          | Granted | 19-DEC-2020     |
| 200070                          | India       | Granted | 19-DEC-2020     |
| 3441723                         | Japan       | Granted | 19-DEC-2020     |
| 527418                          | Korea       | Granted | 19-DEC-2020     |

Invention: Method for Purification of Acetone

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| 6,303,826                       | US      | Granted | 19-JAN-2020     |

Invention: Cumene Synthesis Process Using Purified Benzene and Propylene Feedstock Streams

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| 6,355,851                       | US      | Granted | 22-JUL-2019     |

Invention: Method for Reducing Methylbenzofuran Levels in High Purity Phenol

| Patent No.<br>(Application No.) | Country | Status  | Expiration Date |
|---------------------------------|---------|---------|-----------------|
| 6,388,144                       | US      | Granted | 15-JUN-2021     |
| 209324                          | India   | Granted | 26-MAR-2022     |
| 549559                          | Korea   | Granted | 26-MAR-2022     |
| 1229663                         | Taiwan  | Granted | 07-APR-2022     |

**Invention: Method for Recovery of Phenol from Aqueous Streams**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 6,620,980                       | US      | Granted | 12-APR-2022        |

**Invention: Optimization of Caustic Usage**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 6,667,178                       | US      | Granted | 18-MAY-2022        |
| ZL02801539.8                    | China   | Granted | 26-MAR-2022        |
| (02723625.6)                    | EP      | Pending |                    |
| 203,773                         | India   | Granted | 26-MAR-2022        |
| 3711110                         | Japan   | Granted | 26-MAR-2022        |
| 543580                          | Korea   | Granted | 26-MAR-2022        |
| 593253                          | Taiwan  | Granted | 08-APR-2022        |

**Invention: Method for Removal of Acetol from Phenol**

| Patent No.<br>(Application No.) | Country  | Status  | Expiration<br>Date |
|---------------------------------|----------|---------|--------------------|
| 7,002,048                       | US       | Granted | 12-APR-2022        |
| (200580026831.5)                | CN       | Granted |                    |
| (05712610.4)                    | EP       | Pending |                    |
| (588/CHENP/2007)                | India    | Pending |                    |
| (2007-525594)                   | Japan    | Pending |                    |
| (2007-7005426)                  | Korea    | Pending |                    |
| (0501000828)                    | Thailand | Pending |                    |
| 1261587                         | Taiwan   | Granted | 05-FEB-2025        |
| (2008-7023910)                  | Korea    | Pending |                    |

**Invention: Method for Removal of Acetol from Phenol**

| Patent No.<br>(Application No.) | Country  | Status  | Expiration<br>Date |
|---------------------------------|----------|---------|--------------------|
| 7,034,192                       | US       | Granted | 09-AUG-2024        |
| (200580008935.3)                | China    | Pending |                    |
| (05712667.4)                    | EP       | Pending |                    |
| (3486/CHENP/2006)               | India    | Pending |                    |
| (2007-504949)                   | Japan    | Pending |                    |
| (0501000767)                    | Thailand | Pending |                    |
| 1266642                         | Taiwan   | Granted | 05-FEB-2025        |

**Invention: Calcium Chloride Purification**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 7,037,480                       | US      | Granted | 22-Oct-2024        |

**Invention: Water Diluted Cumene Hydroperoxide Solutions**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 7,049,474                       | US      | Granted | 12-SEP-2020        |

**Invention: Method and Apparatus for In-Process Handling of Cumene Hydroperoxide with Improved Safety**

| Patent No.<br>(Application No.) | Country  | Status  | Expiration<br>Date |
|---------------------------------|----------|---------|--------------------|
| 7,126,029                       | US       | Granted | 2-JUL-2025         |
| (200580003804.6)                | China    | Pending |                    |
| (05705088.2)                    | EP       | Pending |                    |
| (2816/CHENP/2006)               | India    | Pending |                    |
| (2006-552118)                   | Japan    | Pending |                    |
| (2006-552118)                   | Korea    | Allowed |                    |
| (0501000163)                    | Thailand | Pending |                    |
| 1264431                         | Taiwan   | Granted | 17-JAN-2025        |

**Invention: Decomposition of Cumene Oxidation Product**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 7,166,752                       | US      | Granted | 11-OCT-2011        |
| (09/865,190)                    | US      | Pending |                    |

**Invention: Process for Recovery of Cumene Hydroperoxide Decomposition Products by Distillation**

| Patent No.<br>(Application No.) | Country  | Status    | Expiration<br>Date |
|---------------------------------|----------|-----------|--------------------|
| 7,186,866                       | US       | Granted   | 14-NOV-2025        |
| (PCT/US06/043848)               | PCT      | Completed |                    |
| 200680042369.2                  | China    | Pending   |                    |
| (06827726.8)                    | Europe   | Pending   |                    |
| t/b/a                           | India    | Pending   |                    |
| (2008-541241)                   | Japan    | Pending   |                    |
| (2008-7011173)                  | S. Korea | Pending   |                    |
| (95136938)                      | Taiwan   | Pending   |                    |
| (0601005548)                    | Thailand | Pending   |                    |

**Invention: Method for Determination of Organic Hydroperoxides**

| Patent No.<br>(Application No.) | Country | Status               | Expiration<br>Date |
|---------------------------------|---------|----------------------|--------------------|
| (11/001,719)                    | US      | Response to OA filed |                    |

**Invention: Process for Production of Biodiesel from High Acid Feed**

| Patent No.<br>(Application No.) | Country | Status               | Expiration<br>Date |
|---------------------------------|---------|----------------------|--------------------|
| (11/431,287)                    | US      | Response to OA filed |                    |

## **SOLID SUPER ACID PATENTS**

### **UNDER CONTRACT WITH UOP**

**Invention: Catalyst for Hydrocarbon Conversion and Conversion Process Utilizing the Same**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 4,956,519                       | US      | Granted | 13-NOV-2009        |

**Invention: Liquid Phase Isomerization of Alkanes**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 5,019,671                       | US      | Granted | 10-JUL-2009        |

**Invention: Solid-Acid Alkylation Catalyst Compositions For Alkylation Processes**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 5,212,136                       | US      | Granted | 27-NOV-2011        |
| 5,214,017                       | US      | Granted | 27-NOV-2011        |

**Invention: Solid Superacid Alkylation Catalyst Compositions and Alkylation Method Using the Same**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 5,493,067                       | US      | Granted | 12-NOV-2013        |

**Invention: Hydrocarbon Isomerization Using Solid Superacid Catalysts Comprising Platinum Metal**

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 5,516,964                       | US      | Granted | 21-JAN-2014        |

**Invention: Solid Superacid Catalysts Comprising Platinum Metal**

| Patent No.<br>(Application No.) | Country     | Status  | Expiration<br>Date |
|---------------------------------|-------------|---------|--------------------|
| 5,629,257                       | US          | Granted | 13-MAY-2014        |
| 0666109                         | Belgium     | Granted | 20-JAN-2015        |
| 2140700                         | Canada      | Granted | 20-JAN-2015        |
| 0666109                         | Germany     | Granted | 20-JAN-2015        |
| 0666109                         | France      | Granted | 20-JAN-2015        |
| 0666109                         | UK          | Granted | 20-JAN-2015        |
| 0666109                         | Italy       | Granted | 20-JAN-2015        |
| 3846914                         | Japan       | Granted | 23-JAN-2015        |
| 0666109                         | Netherlands | Granted | 20-JAN-2015        |

**Invention: Liquid Phase Isomerization of Alkanes**

| Patent No.<br>(Application No.) | Country     | Status  | Expiration<br>Date |
|---------------------------------|-------------|---------|--------------------|
| 5,648,590                       | US          | Granted | 15-JUL-2014        |
| 0408318                         | Belgium     | Granted | 10-JUL-2010        |
| 2020054                         | Canada      | Granted | 28-JUN-2010        |
| 0408318                         | Germany     | Granted | 10-JUL-2010        |
| 0408318                         | France      | Granted | 10-JUL-2010        |
| 0408318                         | UK          | Granted | 10-JUL-2010        |
| 0408318                         | Italy       | Granted | 10-JUL-2010        |
| 2799902                         | Japan       | Granted | 09-JUL-2010        |
| 0408318                         | Netherlands | Granted | 10-JUL-2010        |

**Invention: Solid Superacid Catalyst Comprising Group VII Metal and Having H<sub>0</sub> Less than -18**

| Patent No.<br>(Application No.) | Country     | Status  | Expiration<br>Date |
|---------------------------------|-------------|---------|--------------------|
| 5,780,383                       | US          | Granted | 14-JUL-2015        |
| 0365147                         | France      | Granted | 20-SEP-2009        |
| 0365147                         | UK          | Granted | 20-SEP-2009        |
| 2942573                         | Japan       | Granted | 21-SEP-2009        |
| 0365147                         | Netherlands | Granted | 20-SEP-2009        |

**Invention: Isomerization of Hydrocarbons with Solid Superacid Catalyst at Supercritical or Near Critical**

| Patent No.<br>(Application No.) | Country     | Status  | Expiration<br>Date |
|---------------------------------|-------------|---------|--------------------|
| 0532153                         | Belgium     | Granted | 01-JUN-2012        |
| 0532153                         | Germany     | Granted | 01-JUN-2012        |
| 0532153                         | France      | Granted | 01-JUN-2012        |
| 0532153                         | UK          | Granted | 01-JUN-2012        |
| 0532153                         | Italy       | Granted | 01-JUN-2012        |
| 0532153                         | Netherlands | Granted | 01-JUN-2012        |

## **MISCELLANEOUS CHEMICAL PATENTS**

Invention: Hydrocracking Using Solid Superacid Catalysts Comprising Platinum Metal (Assigned to "Sun Company, Inc. (R&M)")

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 5,494,569                       | US      | Granted | 21-JAN-2014        |

Invention: Naphtha Upgrading Using Solid Superacid Catalysts Comprising Platinum Metal (Assigned to "Sun Company, Inc. (R&M)")

| Patent No.<br>(Application No.) | Country | Status  | Expiration<br>Date |
|---------------------------------|---------|---------|--------------------|
| 5,494,571                       | US      | Granted | 21-JAN-2014        |