



# c&en's GLOBAL TOP 50

## Strong industry performance continues as profits rise despite declining sales

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**I**f C&EN's annual ranking of the Global Top 50 chemical companies is any indication, the industry remains strong. The industry repeated the same unusual pattern in 2016, the year on which the survey is based, as it did in 2015. Sales declined, yet profits rose.

Combined sales for the chemical businesses of the 50 companies fell 4.4% in 2016 to \$744.3 billion. Sales shrank for 38 of the companies.

However, for the 47 companies that post earnings figures, combined profits increased 2.6%, to \$98.2 billion over the same period. Only 17 of these firms posted earnings decreases, and no company suffered a loss. It appears that for chemical companies, which are in business to make money, 2016 wasn't such a bad year.

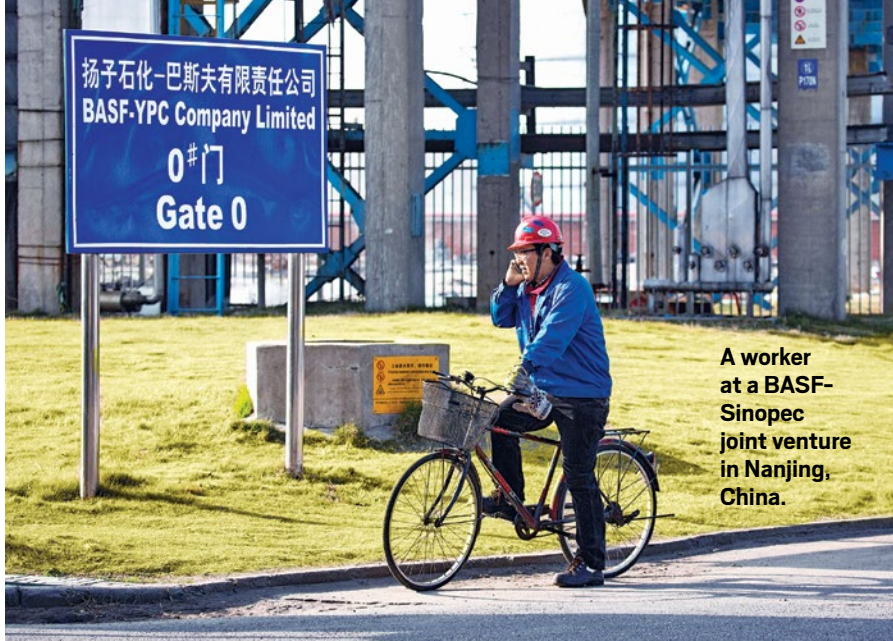
The pattern was even more pronounced in 2015, when sales dropped 10.8% while profits increased 15.1%. Declining prices for oil, a key input, plus a strong economy explain the results for both years.

Few structural changes are evident in this year's survey. Two firms, Honeywell and PotashCorp, slipped from the ranking. Honeywell left because it spun off much of its chemical business. PotashCorp is gone because of declining sales.

Joining C&EN's Global Top 50 are Tosoh and Clariant.

Next year's ranking should see bigger changes. Notably, Dow Chemical and DuPont are set to become DowDuPont next month, leaving an empty slot near the top.





A worker at a BASF-Sinopec joint venture in Nanjing, China.

## 4 SABIC

► **2016 Chemical Sales:** \$31.0 billion  
The biggest recent developments for SABIC are outside its home country of Saudi Arabia. In what would be its first major U.S. petrochemical project, the company is studying whether to build an ethylene cracker with partner ExxonMobil near Corpus Christi, Texas. The site would see an estimated \$10 billion investment from the firms that includes a 1.8 million-metric-ton-per-year ethylene cracker, billed as the world's largest. It would also have ethylene glycol and polyethylene plants. The plan faces opposition from residents of Portland, Texas, who say the plants would be inappropriately situated near a residential neighborhood. SABIC is also planning a coal-to-chemicals facility in China with the Chinese coal firm Shenhua.

## 5 Formosa Plastics

► **2016 Chemical Sales:** \$27.1 billion  
Formosa Plastics affiliate Formosa Petrochemical hopes to have required air pollution permits in place next year for the \$9.4 billion ethylene cracker complex it is planning in Louisiana. Formosa Plastics is already building its own ethylene complex in Texas. Formosa is also investing in smaller projects closer to its home base of Taiwan. Formosa Petrochemical and Japan's Idemitsu Kosan are building a \$50 million plant in Taiwan to make hydrocarbon resins used in hot melt adhesives. Formosa's joint venture Formosa Mitsui Advanced Chemicals is expanding capacity for battery electrolyte solutions in Ningbo, China.

## 6 ExxonMobil

► **2016 Chemical Sales:** \$26.1 billion  
In a rare move for the firm, ExxonMobil inked an acquisition this spring. It is buying Jurong Aromatics, a Singapore-based

## 1 BASF

► **2016 Chemical Sales:** \$60.7 billion  
BASF is once again the largest chemical company in the world. But Dow Chemical and DuPont expect to merge next month. With combined 2016 sales of nearly \$68 billion, the merged firms will likely edge out the German chemical giant. BASF's management doesn't seem to feel pressured to react. Last year's \$3.2 billion purchase of the Chemetall metal surfaces business from Albemarle wasn't small change, but it was no blockbuster deal either. Last November, BASF Chief Executive Officer Kurt Bock told a small gathering of reporters he didn't want to make acquisitions merely for the sake of getting bigger. Indeed, Bock has been discriminating. Analysts had expected BASF to buy agricultural businesses that are divested so that the big mergers—such as Dow/DuPont and Bayer/Monsanto—can pass regulatory hurdles. But the company passed on picking up the large piece of DuPont's agrochemicals unit that ultimately went to FMC.

## 2 Dow Chemical

► **2016 Chemical Sales:** \$48.2 billion  
Dow Chemical's merger with DuPont has been cleared by antitrust authorities around the world, and DowDuPont will soon be a reality. But the new firm will occupy a top slot in future C&EN rankings for only a year or so. DowDuPont will split into three separate firms—in agricultural chemicals, specialty products, and material science—18 months after the merger is complete. Meanwhile, an old Dow antagonist, activist investor Daniel S. Loeb, has resurfaced. His hedge fund, Third Point, has picked apart the DowDuPont split-up scheme. Some of its critiques are minor.

For instance, it says Dow's food ingredients business should dovetail with DuPont's food-related business in the specialty products firm instead of going to the material science company. Others are bigger. Loeb thinks silicones, the old Dow Corning business earmarked for the material science firm, would be better off in specialty products. Third Point opines that the specialty products company could eventually be broken into four stand-alone firms making silicones, electronic materials, nutritional ingredients, and specialty materials. After the prodding, Dow and DuPont hired the management consulting firm McKinsey & Co. to give the breakup plan a second look.

## 3 Sinopec

► **2016 Chemical Sales:** \$42.8 billion  
Sinopec had a great 2016. The Chinese firm bucked a petrochemical industry trend of declining sales with a modest boost in revenue. Profits also improved. Sinopec has meanwhile been making strategic moves. It is buying BP's 50% interest in Shanghai Seco Petrochemical, a joint venture ethylene complex the two firms completed in 2005 at a cost of \$3 billion. Sinopec also signed deals with Saudi Aramco and SABIC to study projects in China and Saudi Arabia. Sinopec may develop a coal-to-chemicals project with Aramco and expand a joint venture with SABIC in Tianjin, China.



ExxonMobil's new polyethylene plant in Mont Belvieu, Texas.

*p*-xylene maker that declared bankruptcy in 2015. The purchase wasn't completely out of the blue. ExxonMobil has operated refineries and petrochemical plants in Singapore for decades. Otherwise, ExxonMobil has been expanding robustly. This year, the company completed a pair of polyethylene plants in Mont Belvieu, Texas. It will soon finish a cracker in Baytown, Texas. ExxonMobil is also planning a polyethylene unit in Beaumont, Texas, and eventually, a \$10 billion petrochemical joint venture with SABIC near Corpus Christi, Texas.

## 7 LyondellBasell Industries

► **2016 Chemical Sales:** \$24.6 billion  
LyondellBasell is the rare major chemical company that isn't building a U.S. ethylene cracker, but that isn't stopping it from spending on new petrochemical capacity. The company's capital expenditures topped \$2 billion in 2016, a more than 50% increase from the year before. It wrapped up an expansion at its Corpus Christi, Texas, ethylene plant, the cornerstone of its plan to boost production at existing facilities quickly and at low cost. In all, the company expanded its ethylene plants by 1.1 million metric tons of production per year, a figure that is larger than the capacity of many of the crackers currently under construction on the Gulf Coast.

## 8 Ineos

► **2016 Chemical Sales:** \$23.5 billion  
New ethylene capacity based on shale gas brings to mind gleaming crackers on the U.S. Gulf Coast. But last year Ineos started using ethane, brought in by sea, to run its ethylene plants in Grangemouth, Scotland, and Rafnes, Norway. Now, thanks to the new feedstock, the company plans on expanding those facilities by 900,000 metric tons per year. Ineos founder Jim Ratcliffe points out that the amount is "the equivalent of building a new world-scale cracker in Europe." He is also considering a propane dehydrogenation plant in Europe. The billionaire wants to bring more than just chemical manufacturing back to Europe. He plans on spending hundreds of millions of dollars to resurrect the discontinued Land Rover Defender off-road vehicle, which he would produce in the U.K.

## 9 Mitsubishi Chemical Holdings

► **2016 Chemical Sales:** \$23.4 billion  
Mitsubishi has had a big appetite for small acquisitions over the past 12 months. The Japanese company bought out the 49%

it didn't already own in Nippon Gohsei, a producer of ethylene-vinyl alcohol copolymers and polyvinyl alcohol films, for \$425 million. Affiliate Mitsubishi Chemical bought the 35% of specialty chemical supplier Nippon Kasei it didn't already have. Another affiliate, Mitsubishi Rayon, made a modest acquisition with its purchase of a carbon fiber plant in Evanston, Wyo., from Germany's SGL.

## 10 DuPont

► **2016 Chemical Sales:** \$19.7 billion  
DuPont's planned merger with Dow Chemical—taken with Bayer's purchase of Monsanto and ChemChina's buyout of Syngenta—alarmed antitrust regulators, who felt it represented too much concentration in agricultural chemicals and seeds. The European Commission weighed in earlier this year, seeking concessions before it would bless the creation of DowDuPont. To satisfy regulators, DuPont is selling a big chunk of its pesticide business to FMC. The sale includes insecticides Rynaxypyr and Cyazypyr, which together generate \$1 billion in annual sales. DuPont is also selling most of its agricultural R&D operations to FMC. DuPont is getting something in return. In addition to \$1.6 billion in cash, FMC is giving DuPont its nutrition and health business. The unit, which supplies texturing agents such as carrageenan and alginates, should align well with DuPont businesses in probiotics and pectin.

## 11 Air Liquide

► **2016 Chemical Sales:** \$19.6 billion  
Air Liquide's acquisition last year of U.S. player Airgas helped the French industrial gas firm expand sales by 13% in a year when most chemical companies posted declines. Air Liquide is the world's largest industrial gas firm, but probably not for

long. Its chief rival, Germany's Linde, has inked an agreement to merge with U.S.-based Praxair.

## 12 LG Chem

► **2016 Chemical Sales:** \$18.1 billion  
LG Chem is spending \$350 million to build an olefin elastomers plant at its site in Daesan, South Korea. The unit will more than triple LG's capacity for ethylene-1-octene and ethylene-1-butene copolymers and make it a more formidable competitor in that business to giants such as Dow Chemical and ExxonMobil. Separately, last year LG Chem acquired pharmaceutical manufacturer LG Life Sciences, which has \$400 million in annual sales.

## 13 Toray Industries

► **2016 Chemical Sales:** \$16.5 billion  
Toray's major capital investment program is its carbon fiber expansion in South Carolina, which could potentially see \$1 billion in spending. But the Japanese company isn't only about aerospace materials. It will spend more than \$320 million over five years to roughly double capacity for synthetic suede at its Italian subsidiary Alcantara. It also formed a joint venture with Mitsui Sugar to use water treatment membranes to help process 15 metric tons of bagasse per day into sugar, polyphenols, and oligosaccharides at a plant in Thailand.

## 14 Linde

► **2016 Chemical Sales:** \$16.5 billion  
In June, Linde and Praxair signed a definitive agreement to merge and become far and away the world's largest industrial gas maker, ahead of Air Liquide. The two firms will combine for \$29 billion in annual sales. However, because of the market concentrations a complete merger would



Linde helium canisters.



# Global Top 50

BASF tops the ranking for the 11th year in a row, but a combined Dow and DuPont could upend it.

RANK		COMPANY	CHEMICAL SALES (\$ MILLIONS)	CHANGE FROM 2015	CHEMICAL SALES AS % OF TOTAL SALES	HEADQUARTERS	CHEMICAL OPERATING PROFITS <sup>b</sup> (\$ MILLIONS)	CHANGE FROM 2015	CHEMICAL OPERATING PROFITS AS % OF TOTAL OPERATING PROFIT	OPERATING PROFIT MARGIN <sup>c</sup>	IDENTIFIABLE CHEMICAL ASSETS (\$ MILLIONS)	CHEMICAL ASSETS AS % OF TOTAL ASSETS	OPERATING RETURN ON CHEMICAL ASSETS <sup>d</sup>
2016	2015 <sup>a</sup>												
1	1	BASF	\$60,653	-4.6%	95.2%	Germany	\$6,395	11.6%	92.0%	10.5%	\$70,490	83.2%	9.1%
2	2	Dow Chemical	48,158	-1.3	100.0	U.S.	5,629	-11.7	100.0	11.7	79,511	100.0	7.1
3	3	Sinopec	42,815	2.8	15.1	China	3,106	4.7	26.7	7.3	21,743	12.1	14.3
4	4	SABIC	30,985	-9.8	87.5	Saudi Arabia	10,101	-5.5	92.6	32.6	40,112	47.5	25.2
5	5	Formosa Plastics <sup>e</sup>	27,141	-5.7	66.2	Taiwan	2,620	-7.6	34.7	9.7	41,714	68.5	6.3
6	7	ExxonMobil	26,058	-7.4	11.9	U.S.	5,917	3.9	71.8	22.7	30,053	9.1	19.7
7	8	LyondellBasell Industries	24,624	-7.7	84.4	Netherlands	5,638	-11.3	101.6	22.9	na	na	na
8	6	Ineos	23,530	-17.2	100.0	Switzerland	4,780	12.8	100.0	20.3	na	na	na
9	9	Mitsubishi Chemical	23,358	-13.9	75.2	Japan	1,954	20.4	69.0	8.4	28,598	69.6	6.8
10	10	DuPont <sup>f</sup>	19,679	-4.9	80.0	U.S.	4,081	4.0	88.0	20.7	12,748	61.2	32.0
11	12	Air Liquide	19,554	13.2	97.4	France	1,914	1.7	100.8	9.8	44,721	97.1	4.3
12	11	LG Chem	18,111	2.2	100.0	South Korea	1,718	9.2	100.0	9.5	17,671	100.0	9.7
13	15	Toray Industries	16,533	-4.4	85.4	Japan	1,427	-3.4	105.6	8.6	19,417	88.0	7.3
14	13	Linde	16,488	-1.8	84.9	Germany	2,453	4.1	96.3	14.9	na	na	na
15	14	AkzoNobel	15,719	-4.5	100.0	Netherlands	1,663	2.7	100.0	10.6	17,932	100.0	9.3
16	17	PPG Industries	14,270	0.2	96.7	U.S.	2,356	3.0	97.8	16.5	15,549	98.6	15.2
17	16	Evonik Industries	14,097	-5.7	100.0	Germany	1,726	-15.1	100.0	12.2	21,750	100.0	7.9
18	22	Reliance Industries	13,769	12.2	28.0	India	1,934	27.5	31.8	14.0	16,462	18.5	11.7
19	18	Braskem	13,692	0.9	100.0	Brazil	2,760	24.0	100.0	20.2	14,826	100.0	18.6
20	21	Sumitomo Chemical	13,396	-9.6	74.5	Japan	831	-30.0	67.2	6.2	16,105	61.1	5.2
21	20	Covestro	13,180	-1.5	100.0	Germany	1,395	93.8	100.0	10.6	11,331	100.0	12.3
22	23	Solvay	12,625	3.2	100.0	Belgium	1,461	14.3	100.0	11.6	26,733	100.0	5.5
23	19	Yara	11,577	-13.2	100.0	Norway	1,045	-37.8	100.0	9.0	14,357	100.0	7.3
24	28	Lotte Chemical	11,406	12.9	100.0	South Korea	2,194	57.9	100.0	19.2	13,686	100.0	16.0
25	25	Mitsui Chemicals	11,157	-9.8	100.0	Japan	940	44.0	100.0	8.4	12,199	100.0	7.7
26	24	Bayer	10,978	-4.4	28.4	Germany	2,101	0.9	27.8	19.1	16,461	20.4	12.8
27	26	Praxair	10,534	-2.2	100.0	U.S.	2,315	-6.1	100.0	22.0	19,332	100.0	12.0
28	27	Shin-Etsu Chemical <sup>f</sup>	9,752	-17.2	85.6	Japan	2,108	9.8	96.0	21.6	na	na	na
29	29	Huntsman Corp.	9,657	-6.2	100.0	U.S.	606	-14.2	100.0	6.3	9,189	100.0	6.6
30	30	Syngenta	9,470	-4.6	74.0	Switzerland	na	na	na	na	na	na	na
31	33	Eastman Chemical	9,008	-6.6	100.0	U.S.	1,428	-8.9	100.0	15.9	15,457	100.0	9.2
32	39	Asahi Kasei	8,994	-3.1	50.9	Japan	777	6.6	45.3	8.6	11,334	54.6	6.9
33	31	DSM	8,769	-11.4	100.0	Netherlands	736	109.8	100.0	8.4	14,347	100.0	5.1
34	32	Air Products & Chemicals	8,554	-13.5	100.0	U.S.	1,864	-0.4	100.0	21.8	17,012	100.0	11.0
35	36	Lanxess	8,524	-2.6	100.0	Germany	597	-6.3	100.0	7.0	10,936	100.0	5.5
36	34	Chevron Phillips Chemical	8,455	-8.6	100.0	U.S.	na	na	na	na	15,465	100.0	na
37	38	Arkema	8,343	-1.9	100.0	France	813	21.5	100.0	9.7	10,020	100.0	8.1
38	37	Borealis	7,991	-6.3	100.0	Austria	1,035	30.1	100.0	12.9	10,996	100.0	9.4
39	43	Hanwha Chemical <sup>f</sup>	7,986	15.2	100.0	South Korea	672	131.2	100.0	8.4	11,919	100.0	5.6
40	45	Ecolab <sup>f</sup>	7,653	-3.8	59.1	U.S.	1,040	-4.7	55.2	13.6	na	na	na
41	46	Indorama	7,220	8.5	100.0	Thailand	414	102.0	100.0	5.7	2,396	100.0	17.3
42	35	Mosaic	7,163	-19.5	100.0	U.S.	506	-62.7	100.0	7.1	16,841	100.0	3.0
43	40	Sasol	7,148	-0.7	60.7	South Africa	1,074	-31.2	65.0	15.0	14,235	53.5	7.5
44	42	DIC	6,915	-12.9	100.0	Japan	499	-3.3	100.0	7.2	7,039	100.0	7.1
45	--	Tosoh	6,838	-1.4	100.0	Japan	1,024	60.2	100.0	15.0	7,202	100.0	14.2
46	41	SK Innovation	6,630	-17.2	19.4	South Korea	792	113.2	28.5	12.0	3,751	13.3	21.1
47	47	Johnson Matthey <sup>f</sup>	6,540	13.3	40.1	England	622	11.8	84.1	9.5	3,537	88.2	17.6
48	44	Lubrizol	6,500	-7.1	100.0	U.S.	na	na	na	na	na	na	na
49	49	PTT Global Chemical	6,151	-1.4	62.1	Thailand	740	14.4	82.9	12.0	8,127	72.9	9.1
50	--	Clariant	5,937	0.7	100.0	Switzerland	433	1.4	100.0	7.3	8,494	100.0	5.1

Note: Some figures converted at 2016 average exchange rates of U.S. \$1.00 = 3.4839 Brazilian reais, 0.7377 British pounds, 6.64 Chinese renminbi, 0.9032 euros, 67.16 Indian rupees, 108.66 Japanese yen, 1159.34 Korean won, 8.3936 Norwegian kroner, 3.75 Saudi riyals, 0.9848 Swiss francs, 32.226 new Taiwan dollars, and 35.264 Thai baht. **a** Prior year rankings are as they appeared in the July 25, 2016, issue of C&EN. **b** Operating profit is sales less administrative expenses and cost of sales. **c** Operating profit as a percentage of sales. **d** Chemical operating profit as a percentage of identifiable chemical assets. **e** C&EN estimates. **f** Sales include a significant amount of nonchemical products. **na** = not available.



### AkzoNobel's headquarters building in Amsterdam.

cause, Linde and Praxair will probably need to make divestitures to clear antitrust hurdles. When the deal is completed in the second half of 2018, the new company will have headquarters in Ireland, not Germany or the U.S.—the respective homes of Linde and Praxair—making it the first Irish firm in C&EN's Global Top 50.

## 15 AkzoNobel

► **2016 Chemical Sales:** \$15.7 billion  
After walking away from an early-2017 acquisition offer from PPG Industries worth more than \$28 billion, AkzoNobel's plan now is to sell or spin off its chemical business and become a paint maker only. The business contains AkzoNobel's chlorine chemicals, bleaching, surfactants, and polymer chemistry businesses and has annual sales of about \$5 billion. Divesting it will fetch the Dutch firm between \$8 billion and \$12 billion, analysts say. Some shareholders are skeptical that the plan is better than selling out to PPG. The most vocal among these, hedge fund Elliott Advisors, even appealed to a Dutch court to allow a vote to remove AkzoNobel's chairperson.

## 16 PPG Industries

► **2016 Chemical Sales:** \$14.3 billion  
PPG provided this year's takeover drama in chemicals. In March, it made an offer to buy Dutch paint rival AkzoNobel for \$22 billion. It was rejected. PPG sweetened the bid to more than \$28 billion, a 50% premium over AkzoNobel's value in March before anyone heard of the overtures. Still, AkzoNobel management refused to negotiate. It is notoriously tough to buy Dutch firms. Many, including AkzoNobel, have a stitching, a foundation of people who hold a special class of shares and act as a fire wall against hostile takeovers. The Dutch financial market authority didn't extend PPG's deadline to make an offer for AkzoNobel past June 1. On that day, PPG walked away.

## 17 Evonik Industries

► **2016 Chemical Sales:** \$14.1 billion  
Evonik has been aggressive about pursuing growth over the past year. The German company completed its \$3.8 billion purchase of Air Products & Chemicals' specialty chemical business in January. It will also soon close on its smaller purchase of J.M. Huber's silica business. In addition to acquisitions, the company has been growing organically. For example, it recently formed a joint venture with DSM for making omega-3 fatty acids from marine algae. The partnership, called Veramaris, plans to build a plant in Blair, Neb.

## 18 Reliance Industries

► **2016 Chemical Sales:** \$13.8 billion  
Reliance rocketed up C&EN's ranking from 22 to 18 this year, and it intends to get even bigger. The company upgraded its cracker in Dahej, India, to allow it to import and process cheap, shale-based ethane from the U.S. Reliance is making similar renovations to two other crackers in its home country of India. With Russia's Sibur, Reliance is building a halogenated butyl rubber plant in Jamnagar, India. The plant will be adjacent to a butyl rubber unit the two companies are also constructing.

## 19 Braskem

► **2016 Chemical Sales:** \$13.7 billion  
Braskem had a pretty good 2016 with a strong, 24% increase in profits on flat sales. The company is also building a polypropylene plant in La Porte, Texas. Despite the commercial success, the Brazilian firm hasn't been able to insulate itself from corruption at home. In an investigation linked to the country's massive "Car Wash" scandal, officials found that Braskem paid bribes to individuals in the Brazilian government. The company is on the hook to pay \$1 billion in penalties to U.S., Swiss, and Brazilian authorities. Brazilian state oil company Petrobras, facing financial pressures of its own, may sell its 36% stake in Braskem.

## 20 Sumitomo Chemical

► **2016 Chemical Sales:** \$13.4 billion  
Sumitomo has emphasized high-tech expansions recently. The Japanese firm plans to triple its capacity at a South Korean subsidiary to make film-based touch-

screen panels for organic light-emitting diode displays. Also in South Korea, it is expanding output of aramid-polyolefin separators for lithium-ion batteries. Additionally, it plans to build a plant in Chiba, Japan, to make the high-performance engineering polymer polyethersulfone.

## 21 Covestro

► **2016 Chemical Sales:** \$13.2 billion  
Spun off from Bayer in 2015, Covestro is growing ever more independent. Last month, Bayer reduced its stake in Covestro from 53% to 45%, raising \$1.2 billion. Covestro has made plenty of strategic moves on its own. In the lab, it recently demonstrated a process to make the methylene diphenyl



Two Covestro scientists discuss polyurethane chemistry.

diisocyanate raw material aniline from sugar. It is also working on a 50% capacity increase for polycarbonate in Shanghai.

## 22 Solvay

► **2016 Chemical Sales:** \$12.6 billion  
The past six years have seen Solvay buying firms including Chemlogics, Cytec Industries, and Rhodia. However, more recently, the Belgian company has concentrated on specialties by divesting unwanted commodity chemicals businesses. In June, Solvay sold its business in acetate tow, which is used to make cigarette filters, to the private equity firm Blackstone. At the turn of the year, the company completed the sales of majority stakes in South American and Thai vinyl businesses.

## 23 Yara

► **2016 Chemical Sales:** \$11.6 billion  
Yara has carved a niche for itself as a technological powerhouse among fertilizer makers. The Norwegian company spent

\$37 million on R&D in 2016, not much money for this purpose by one of the world's largest chemical companies but still an unusual amount for a fertilizer maker. The figure is also nearly double the company's 2015 technical budget. The spending

has delivered results. Yara licensed technology to Bayer that allows farmers to determine the amount of crop nutrients they need to apply to their fields. The system involves an optical device mounted on a tractor and a smartphone app.

## Spending

Reliance Industries and Sasol are stepping up capital spending.

	CHEMICAL CAPITAL SPENDING			CHEMICAL R&D SPENDING		
	2016 (\$ MILLIONS)	% CHANGE FROM 2015	% OF CHEMICAL SALES	2016 (\$ MILLIONS)	% CHANGE FROM 2015	% OF CHEMICAL SALES
Air Liquide	\$2,408	11.1%	12.3%	\$319	2.2%	1.6%
Air Products & Chemicals	1,056	-34.6	12.3	132	-5.0	1.5
AkzoNobel	702	-2.6	4.5	402	4.6	2.6
Arkema	493	-9.7	5.9	245.8	6.2	2.9
Asahi Kasei	434	-17.5	4.8	na	na	na
BASF	6,801	46.6	11.2	2,019	-4.2	3.3
Bayer	856	4.9	7.8	1,289	6.9	11.7
Borealis	369	-0.9	4.6	127	-0.1	1.6
Braskem	815	-30.0	6.0	na	na	na
Clariant	302	-20.6	5.1	209	0.0	3.5
Covestro	464	-17.7	3.5	287	0.8	2.2
DIC	288	0.2	4.2	103	-7.9	1.5
Dow Chemical	3,804	2.7	7.9	1,584	-0.9	3.3
DSM	457	-9.8	5.2	342	-9.1	3.9
DuPont	704	-8.9	3.6	1,412	-16.1	7.2
Eastman Chemical	626	-4.0	6.9	219	-12.7	2.4
Evonik Industries	1,050	3.5	7.4	485	0.9	3.4
ExxonMobil	1,945	-22.0	7.5	na	na	na
Huntsman Corp.	421	-36.5	4.4	152	-5.0	1.6
Indorama	380	30.4	5.3	10	-0.2	0.1
Johnson Matthey	265	16.4	4.0	272	6.8	4.2
Lanxess	486	1.2	5.7	145	0.8	1.7
LG Chem	345	34.4	1.9	585	21.8	3.2
Linde	1,838	-11.7	11.1	84.1	-8.4	0.5
LyondellBasell Industries	2,006	52.1	8.1	99	-2.9	0.4
Mitsubishi Chemical	1,536	15.0	6.6	na	na	na
Mitsui Chemicals	409	3.6	3.7	283	-2.2	2.5
Mosaic	843	-15.7	11.8	na	na	na
PPG Industries	402	-15.5	2.8	466	-4.1	3.3
Praxair	1,465	-4.9	13.9	92	-1.1	0.9
Reliance Industries	3,211	378.5	23.3	na	na	na
Sasol	3,682	111.9	51.5	na	na	na
Shin-Etsu Chemical	1,300	9.3	13.3	na	na	na
Sinopec	1,333	-49.8	3.1	na	na	na
Solvay	978	-7.2	7.7	338	10.1	2.7
Sumitomo Chemical	961	24.9	7.2	na	na	na
Toray Industries	1,336	12.9	8.1	na	na	na
Tosoh	347	35.2	5.1	133	5.1	1.9
Yara	1,534	33.7	13.2	37	93.8	0.3

Note: Figures are for companies on page 33 reporting capital and/or R&D expenditures. na = not available.

## 24 Lotte Chemical

► **2016 Chemical Sales:** \$11.4 billion  
The chemical arm of the South Korean food and financial services conglomerate Lotte has gotten hefty through acquisitions in recent years, including Malaysia's Titan and parts of South Korea's Samsung SDI. However, Lotte hasn't been able to connect on deals for the past year or so. The company tried to rescue the U.S. vinyls maker Axiall from a hostile bid by Westlake Chemical, but it failed. Lotte also made a bid for Jurong Aromatics in Singapore, but it lost out to ExxonMobil. Earlier this month, Lotte Chemical Titan raised \$880 million in an initial public offering in Malaysia.

## 25 Mitsui Chemicals

► **2016 Chemical Sales:** \$11.2 billion  
Japan's Mitsui Chemicals may soon be participating in the U.S. shale boom. Chiba Chemicals, its joint venture with Idemitsu Kosan, is upgrading an ethylene cracker in Chiba, Japan, to allow it to process imported propane. The companies won't say where they are getting the propane, but the U.S., which is flooding the international market with cheap shale-derived propane, is a good bet. Although the cracker upgrade isn't yet complete, Mitsui is still doing well. Crediting higher productivity, it posted a 44% increase in earnings during its most recent fiscal year. ■

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Yara fertilizers are used in Ghana.