TRIDENTGROUP

Product Identified under Product Development

in Chemicals Division

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Dept. Chemical marketing

Market Survey and Analysis

Aim - To Identify the Market potential and Manufacturing scope of various value added products from Sulphuric acid.

Resources used

Primary research

- Internet Search and Library

Secondary research

- Visiting Dealers and Cold calling

Contents – Different products

- Phosphoric Acid
- Ammonium Sulphate
- Hydrofluoric Acid
- Chlorosulphonic Acid
- Dimethyl Sulphate
- Sulphamic Acid
- Oleum
- Poly Aluminum Chloride (PAC) – Identified from Market Survey
- Acid Slurry – Identified from Market survey
- Single Super Phoshate

Phosphoric Acid (H_3PO_4)

- Phosphoric acid is produced by reacting **sulfuric acid (H2SO4)** with naturally occurring phosphate rock.
- Two grades- **Fertilizer Grade and Technical Grade**
- Phosphoric acid is made by two processes:

The 'wet' process

Thermal process

Market Potential (India)

- Current market demand (2018 Data)

- **4948**(KTPA- Kilo tonnes per annum) =**4948000** tonnes

CAGR of 5.96% till 2030 will reach to **8773 KTPA**

Mostly used in Western region of India.

Demand in Punjab Region - Around 15-16 tonnes required by Tez Acids and Gagan vanaspati, also other oil refinery in Punjab

Reasons for growth

-Growing Fertilizer industry owing to demand in food production

-Mostly used in Agriculture And Fertilizer Industry , **other industry procure it through spent**.

-Various subsidies of government on Fertilizers

-Used in formation of phosphate fertilizers

Current Manufacturers –Major players in the Market

- GACL
- Grasim chemicals
- Paradeep Phosphates

PRICING

Range 60-114/kg mostly concentrated round **65-70/kg** (72/kg retail price)

Customer or the industry where Phosphoric acid is used

Fertilizers
Pharmaceutical
Food & Beverage (cold drinks)
Detergent
Metal Treatment (Electroplating)
Water Treatment

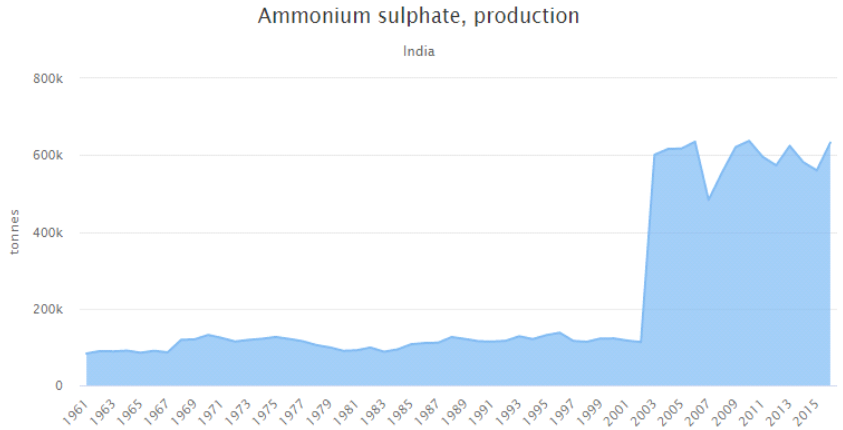
Top countries Importing Phosphoric Acid

India- 3-4 Million MT

European Union- 1-5 Million MT

Ammonium Sulphate (NH) SO

Ammonium sulfate is prepared from ammonia and **Sulfuric acid**.
Two grades –
Technical Grade
Reagent Grade



Market Potential (India)
Current market production around 700000 **tonnes**
-(+12.96% increase in production from last year)
CAGR of 4.9%(Globally)

Reasons for growth in the industry-
Growth in Fertilizer industry
Government gives Subsidy for ammonium Sulphate on the basis Nutrient Content.

Current Manufacturers –Major players in the Market

Indian Potash Limited

GSFC

Deepak Fertilizers

PRICING

Range 13-93/kg mostly concentrated round **50/kg**

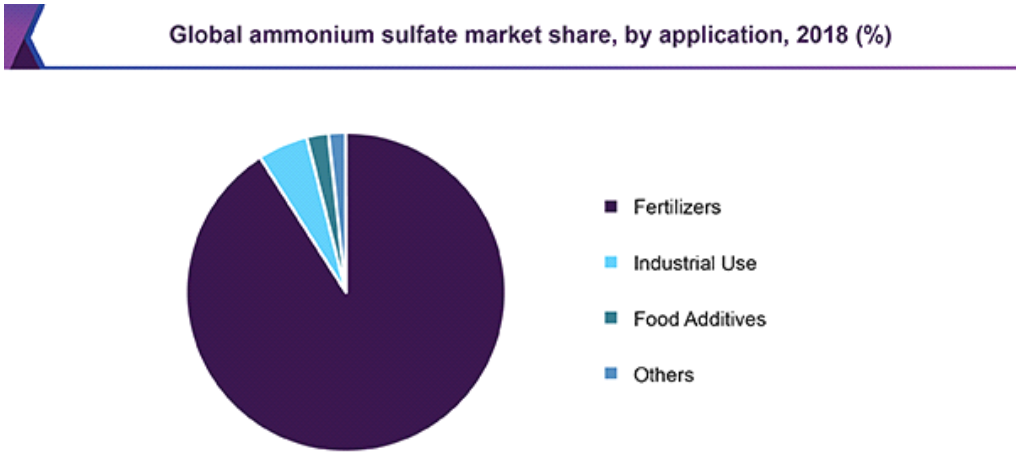
Customer or the industry where Phosphoric acid is used

Fertilizer

Pharmaceuticals

Dyes

Water treatment



Source: www.grandviewresearch.com

Hydrofluoric acid

Hydrofluoric acid is produced by treatment of the mineral fluorite (CaF2) with concentrated **sulfuric acid.**

Four grades –

- **Technical Grade**
- **Bio-Tech Grade**
- **Analytical Grade**
- **Electronic grade**
- It can be used in the anhydrous form -- anhydrous hydrofluoric acid (AHF) -- or in the dilute form -- aqueous hydrofluoric acid .

Market Potential (Globally)

1.57 Million tonnes –growth up to 2.57 million tonnes.

- CAGR of 5.5%(Globally)
- India to increase demand by more than 5% until 2021

Reasons for growth in the industry-

- India and China are the highest importer of the same.
- Manufacturing of fluorochemicls owing to application in home appliances

Current Manufacturers –Major players in the Market

- S.B. Chemicals
- Tanfac industries
- Naveen fluoric(From market survey)

PRICING

- Most of the products of Hydrofluoric Acid ranges from Rs 76 to 195 per Kg

Hydrofluoric Acid Price Range No. of Products(%)

- Rs 76 – 96 -14%
- Rs 96 – 120 -19%
- Rs 120 – 150- 27%
- Rs 150 – 195 -20%

- **Customer or the industry where Hydrofluoric acid is used**
- Semiconductors and microelectronics applications
- Electronic and IOT enabled equipments.
- Metal processing, steel pickling, metal surface treatment,

Chlorosulphonic acid(HSO_3CL)

- The industrial synthesis entails the reaction of hydrogen chloride with a solution of sulfur trioxide in sulfuric acid
  - HCl + SO3 → ClSO3H

Grades available

Pharmaceutical Grade
Industrial Grade

Market Potential

- CAGR of 8.50% over FY2017-FY2022
- India to increase demand by more than 5% until 2021

Reasons for growth in the industry-

- Stabilization of sales prices of dyes and intermediates
- Growth in pharmaceuticals industry

Current Manufacturers –Major players in the Market

- Aarti Industries – Gujarat
- Joshi group
- Shivshakti acid

PRICING

- Most of the products of chlorosulphonic acid ranges from – 20.5-45/kg

Customer or the industry where Chlorosulphonic acid is used

- DYES
- Pharmaceutical
- Agrochemical
- Plastic Industries
- Others

Dimethyl Sulphate $(CH_3O_2)SO_2$

Dimethyl sulfate can be synthesized in the laboratory by many different methods, the simplest being the esterification of **sulfuric acid with methanol,.**

Grades available-

- Purity 98%
- Purity 99%

Others

Market Potential

Application

Dyes and photographic chemicals

Methyl ethers like anisole and anisole derivatives

Flocculants for water treatment

Current Manufacturer

Remik industries-Gujarat

Aarti industries-Maharashtra

ISPCL Gujarat

Chem india

Kevya chem

Pricing

Industrial grade 40-65/kg

Mostly concentrated around 60/kg

Customers	**Potential Clients**
Agrochemicals	Ranbaxy, Dr. Reddys, Du pont, 3M, Bayer
Aromatics,	
Water treatment	
wood pulp industries	
Dyestuff industries	

Sulphamic acid(SO_3NH_3)

- Sulfamic acid is produced industrially by treating urea with a mixture of sulfur trioxide and sulfuric acid (or oleum)

Grades available

GP Grade: The GP grade may be used for removing scales obtained from water in heating and cooling systems e.g. boilers, heat exchangers, condensers, jackets and coils.

SR Grade: This formulation is recommended for scales containing high silica. Typical examples are scales found in caustic evaporators in the Aluminum industry and black liquor evaporator in the pulp industry.

TM Grade: This formulation is recommended for removal of scales from heat exchangers made of Titanium metal.

Sulfamic Acid Market by Type: *Crystal. Powder. Liquid. Others*

Market Potential

Not much demand in Punjab region ,hardly around 20-50 tonnes as collected from Market Survey

Reasons for growth in the industry-

- Stabilization of sales prices of dyes and intermediates
- Growth in pharmaceuticals industry

Current Manufacturer

Raviraj chemicals

Mingda chemicals

Nissan chemicals

Pricing

Industrial grade 30-60/kg, mostly at 36/kg

Customers

Plastic industry as a curing agent

Descalant – GP grade

Electroplating, Electrorefining , In Boilers

Chlorine stabilisation

OLEUM ($Y*SO_3NH_3$)

- Oleum is produced in the contact process, where sulfur is oxidized to sulfur trioxide which is subsequently dissolved in concentrated sulfuric acid. Sulfuric acid itself is regenerated by dilution of part of the oleum.

Oleum is a liquid at moderate temperatures and is stored in specially designed and vented storage tanks.

Two grades- 23% ,65%

Market Potential

Reasons for growth in the industry-

- Sulphuric acid production
- As an intermediate for transportation
- Organic chemistry research
- Explosive manufacturing

Current Manufacturer

Kiri Industries

Aarti Industries

Pricing

Not much different than sulphuric acid.

Mostly concentrated around 9-10/kg

Customers

Basic chemical for sulfonation processes (chemically adding sulfate),

Nylon manufacturing

The production of dyes

Nitrating reactions

Hydrofluoric acid (HF) production

PAC(Poly aluminium chloride-AL2CL(OH)5)

- Powder Form –Major demand.
- Is a By-Product of several Alkalies Unit
- Major Raw Materials - **Sulphuric acid/HCL,Aluminium Hydroxide**

Market Potential

Demand in Punjab region-Around 500 tonnes.

NFL ,Oswal fertilizers, Paradeep phosphates uses in huge quantity.

In Textile Industry Uses , paper industry such as Haripur paper uses.

Plant costs around 3 to 4 crores and in a space of 1000 sqft

Reasons for Growth

Coming up as an replacement of alum

Less alkaline in nature than alum

Maintains the purity of water in water treatment (Likely to grow market)

Only two to three major players

Current Manufacturers

GACL, GRASIM Industries, DCM Kota, Kanoria chemicals

By product of IOL in Punjab around 3000 tonne sale of 9-10%

400-500 tonne sale of 14%

200-300 tonne sale of 12%

PRICING (Data as collected from market survey)

32-33/KG in the market

28% powder form priced at 30/kg

12% priced 4000-4500/ tonnes

14% priced at 5000-5500/tonnes

18% priced at basic of 8000/tonne

USES

-Substitute of alum in Water treatment industry

-Majorily in PaperMill industry. Around 60-70%of paper industry (Input from Market survey)

-Cosmetics Industry

-Oil and Gas industry

-paper industry

Acid Slurry (ALKYL BENZENE SULPHONATE)

- Sulphonation product made by sulphonation of linear alkyl benzene **by oleum or so3 or Sulphuric acid or combinations of above. It** is used in manufacturing of various detergents
- Oleum is getting replaced by Acid slurry these days.
- Using Sulphuric Acid,Benzyne etc
- Raw material consumption per tonne of 85-88% acid slurry is given below:

  (a) Linear alkyl benzene 700-750 Kg.

  (b) Sulphonating agent 20% **oleum800- 900 Kg. 98% Sulphuric acid - 110–120** Kg.

Market Potential (India)

Concentrated around Bombay Region.

Reasons for growth

- Easy to produce
- Oleum replacement

- **Current Manufacturers**

- **Pricing**

65-95/kg

- **Uses**

Textile industry, Dye industry

Single Super Phosphate

- Superphosphate is manufactured by reacting insoluble phosphate rock with **sulfuric acid** to form a mixture of soluble mono-calcium phosphate and calcium sulphate (approximately 9% phosphorous) which is able to be used by plant
- Prepared in three grades same as sulphuric acid

  LR grade , Battery grade , Commercial Grade

Market Potential (India)

Reasons for growth

Always used feritilizer

- **Current Manufacturers**

  Khaitan chemicals

- **Pricing**

  8-9/kg

- **Uses**

  Single Super Phosphate (SSP) fertilizer is mainly used for improving root growth and chlorophyll synthesis and thus improves product quality.

  As a fertilizer.

Questionnaire

- Any generalized information about the products if any?
- Who are the major producers of the same chemical?
- Effective Demand In Punjab/North Region ?
- Feasibility in Producing the same?
- Major Consumers?
- What is the current prevailing price in the market?
- Best to produce among all set of chemicals?

  Phosphoric Acid
  Ammonium Sulphate
  Hydrofluoric Acid
  Chlorosulphonic Acid
  Dimethyl Sulphate
  Sulphamic Acid
  Oleum
  Poly Aluminum Chloride (PAC)
  Acid Slurry
  Single Super Phosphate
- Any other source of information which will be helpfull for the survey?
- Any other value added products you want to suggest?

Analysis

Places Visited **Chandigarh, Ludhiana local market, Delhi.**

Total no. of Dealers Visited= 14

Recommendation and Demand according to producers

Location	Dealers	Recommended	Reasons
Delhi	Amco Speciality	Phosphoric acid	Deals in Same and purchases from other Dealers
Delhi	Chaudhary Chemicals	Ammonium Sulphate	---
Delhi	JLKK Pharma	Acid Slurry	Deals in same and sells around 15-20 tonnes monthly
Delhi	Alliance Global	Acid Slurry and Phosphoric Acid	Just by their Market knowledge and demand
Delhi	Advance Chemicals Sales Coporation	Phosphoric acid	Strongly recommend , Demand can go upto 1000 tonnes monthly in Sugar season
Delhi	Scientific Industries	No Comments	
Delhi	Boconj Engineers	Sulphamic acids As it uses the same	Requires around 300-350 tonnes of sulphamic acid yearly
Delhi	Parnami Dyes	Phosphoric acid and acid Slurry	As per daily selling and market knowledge
Delhi	Ajay Chemicals	Phosphoric Acid	
Chandigarh	SNS Enterprises	PAC(Poly Aluminium Chloride)	Huge demand in upcoming time for watertreatment its used as powder
Chandigarh	Mulakh Raj and sons	Phosphoric Acid	
Chandigarh	Beckson India	Acid Slurry	By the industry Demand
Ludhiana	Nihal Chand and sons	Phosphoric Acid	Very good Demand and cost of transporatation is also high
Ludhiana	NBC Enterprises	Single Super phosphate	Acco. To the industry experience

Inputs from Dealers

Alliance Global

- Only in the business of some chemicals
- Phosphoric Acid –Priced at 60-65/kg(Manufacturer price)
- Acid slurry (Most demanded of all chemicals but there are many small manufacturers) Priced at 85/kg for 90%, requirement of 200-30 0 tonnes monthly

Advance chemicals Sales Corporation

- Suphamic acid monthly required in north region around 100-200 tonnes priced at 28-30/kg.

  (Mostly used in herbicides, descalant and dying)
- Phosphoric Acid required around 500 tonnes in north region but in sugar season can go upto 1000 tonnes . Mostly required food grade (60/kg). Current manufacturers (Aditya birla ,punjab alkalies)
- Only Wet process of manufacturing uses Sulphuric Acid and demand will depend on purity which can be manufactured . Mostly market uses From thermal process
- Phosphoric manufactured by Thermal process all time versatile.
- Acid slurry 90% at 80/kg manufactured by Phogla group and Advance surfactants.
- Ammonium Sulphate can be known only through Fertilizer route
- Hydrofluoric Acid in different purity around 40,50,60% with major manufacturer as Tanfac, Naveen fluorics.
- PAC(poly Aluminium Chloride) 30-32/kg mostly by Grasim

Scientific Industries

- Doesn't Deal with Commercial market only in lab chemicals.
- Recommended for Chemical weekly –PUBLISHED FROM BOMBAY

Boconj Engineers

- Only require Sulphamic Acid and oleum around 300-400 tonnes , if supplied below their price.
- Rest no Data regarding other chemicals but recommended for Phosphoric Acid.

JLKK Pharma

- Not regular demand mostly Food chemicals
- Uses acid slurry around 15-20 tonnes (Monthly) from Mumbai and Gujarat
- Sulphamic acid requirement of 10-12 tonnes monthly
- Potassium Sulphate 5-6 tonnes monthly

Amco industries

- (Second Dealer of acids such as Phosphoric, Hydrofluoric, Sulfuric –All washing Chemicals) (Can become a potential customer)
- Buys PHOSPHORIC Acid At Around 80/kg and hydrofluoric at 90/kg
- Used in washing and Metal Treatment (Approx Delhi Consumption monthly -400 tonnes)
- Requires Sulphuric Acid(Commercial Grade) At 8-8.5 /kg (monthly requirement of 25-35 tonnes)

Parnami Dyes

- Recommended for Phosphoric Acid and Acid slurry used in huge quantity with Major demand in the market.

Ajay chemicals

- Recommended for Acid Slurry and Phosphoric Acid

Quantitative Data as collected from Secondary research For most demanded products

Products	Demand	Pricing	Manufacturers
Phosphoric Acid	500 Tonnes and can go upto 1000 tonnes in sugar season in and around Delhi Region	60-65/kg	GACL, Grasim , Paradeep Phosphates
Sulphamic Acid	100-200 region in Delhi Region	28-30/kg	Raviraj Chemicals, Nissan Chemicals
Acid Slurry	200-300 Tonnes	85/kg for 90%	Not concentrated around one
PAC	500 Tonnes in Punjab region owing to more use in water treatment	32-33/kg	IOL, GACL, GRASIM By Aditya Birla

Out of all the Dealers met in Ludhiana, Chandigarh , Delhi

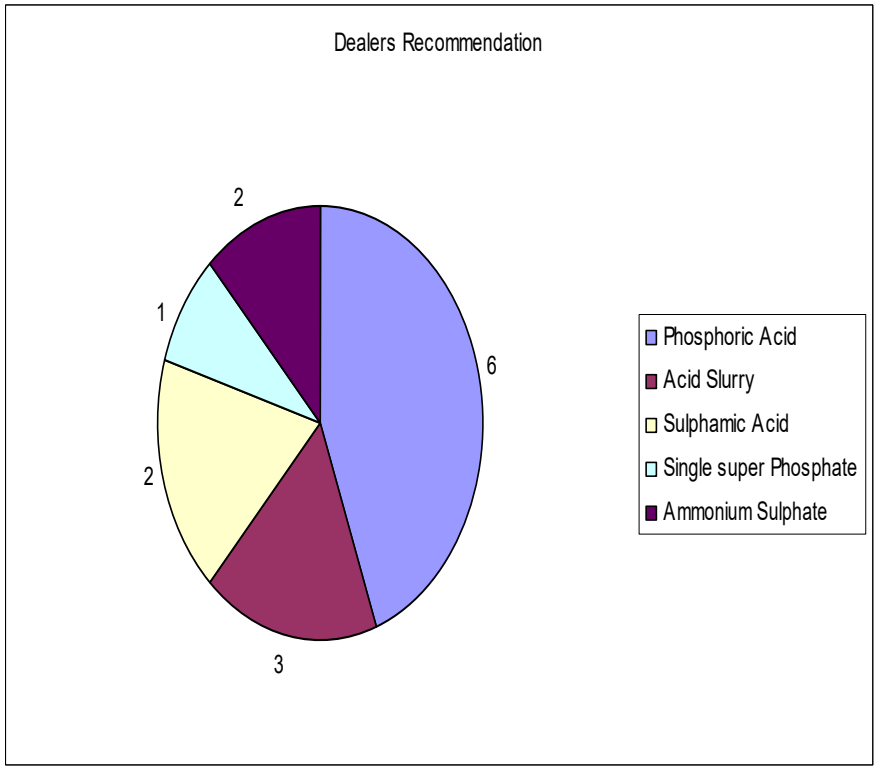
6 dealers recommended for PHOSPHORIC ACID

3 recommended for Acid Slurry

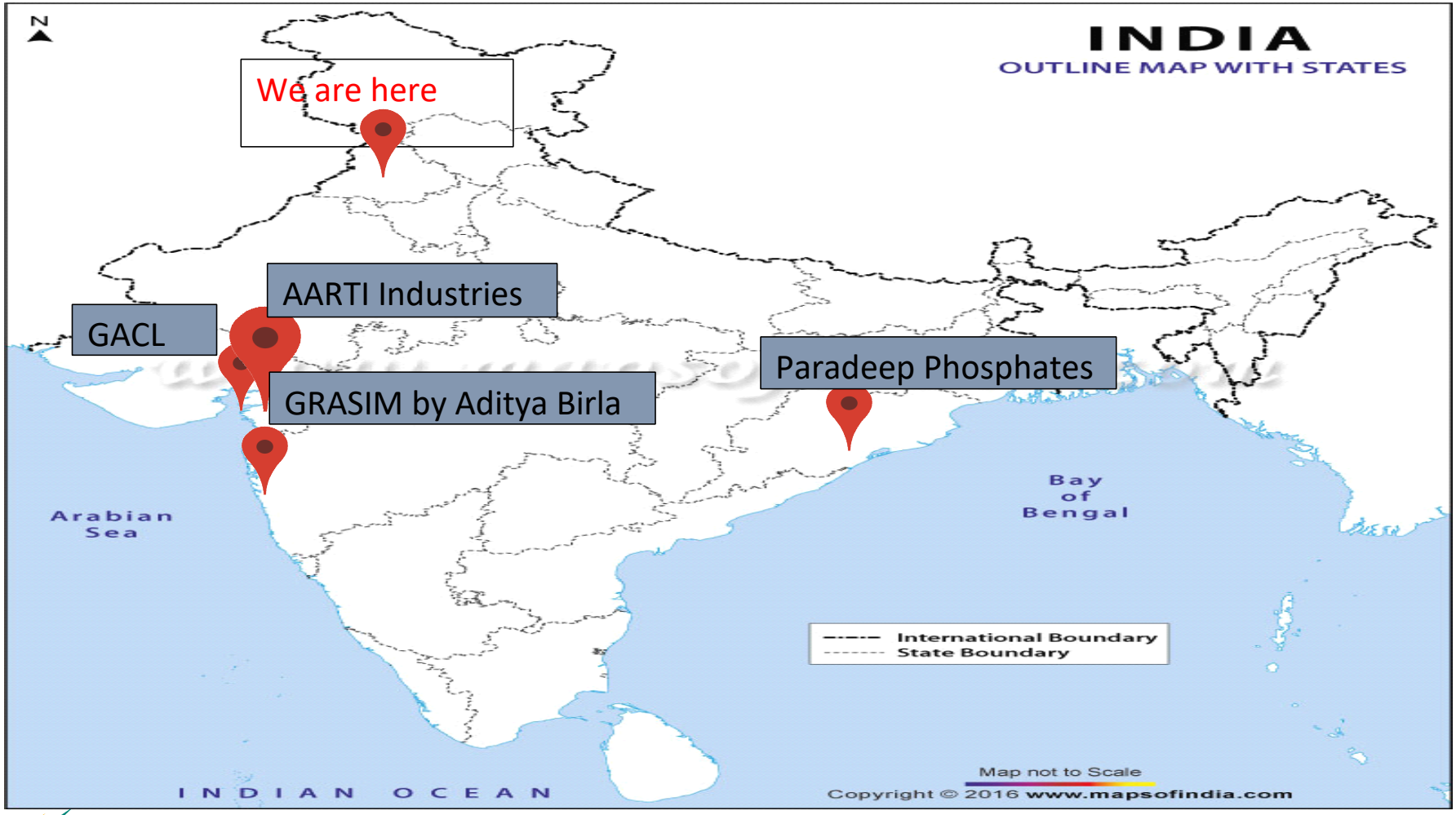
2 recommended for Sulphamic Acid

2 for ammonium Sulphate

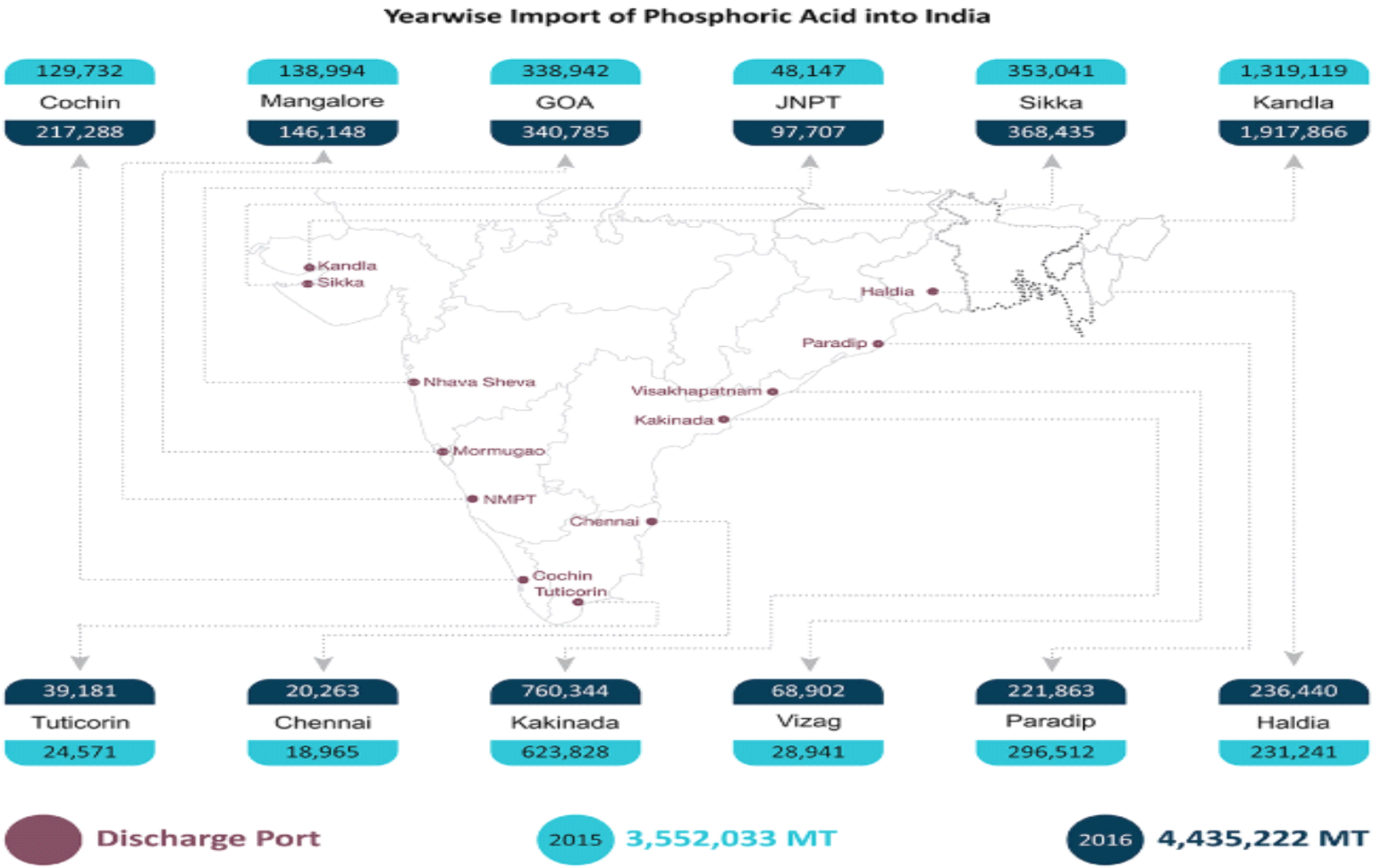
1 recommended for Single super Phosphate



Phosphoric Acid (Manufacturers)



Importing ports of PHOSPHORIC ACID



Some additional Information
Out of total 100% consumption in INDIA, 45% of Phosphoric Acid is being imported

India imports around 3-4 Million MT

Uses	Sub uses
Fertilizers	In all Phosphates Fertilizers industry
Pharmaceutical	Used in Anti-Nausia and aminocyn Products
Food And Beverages	Acidulation of Soft drinks,Manufacturing of Cottage and Processed cheese, Control of Bacteria Growth In selected processed foods
Detergent	Dispersing Agent
Metal Treatment	Soldering Flux
Water treatment	Corrosion Controls

Important Conclusions

- Out of 14 dealers visited across places such as Delhi, Ludhiana, Chandigarh and all the primary Research done Phosphoric Acid tops the Product List with Highest Demand and less supply .
- Phosphoric Acid to be manufactured by Wet process which uses sulphuric Acid should be manufactured with high quality output.
- Most of the manufacturers of phosphoric acid lie around Gujarat region which increases the transportation cost.
- Acid slurry and Sulphamic Acid have the most demand after phosphoric acid and is required in some niche areas
- PAC (Powder form) can also turn out to be one of the important products as the Growing demand of water treatment in the present scenario.
- OLEUM has been totally replaced by acid slurry in market .

TRIDENTGROUP

Marketing Analysis And Feasibility
PHOSPHORIC ACID

Dept. Chemical marketing

Phosphoric Acid

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Food & Beverage (cold drinks)

Detergent

Metal Treatment (Electroplating)

Water Treatment

Top countries Importing Phosphoric Acid

India- 3-4 Million MT

European Union- 1-5 Million MT

Importers of phosphoric Acid

CONSUMPTION AREAS

Major importers of Phosphoric Acid are the fertilizer companies which have annual COAs with the supplying nations. Almost all the importing Fertilizer plants are located along the Indian coastline with the western region dominating with the largest number of plants. Accordingly, most of the imports are to the ports on West coast of India, followed by South and then East. Northern region of India controls a very limited share in the Indian phosphoric acid market owing to limited fertilizer production facilities in the region.

Receiver	Qty in MT		
	2015	2016	
Indian Farmers Fertilizers Co.Op. Ltd.	1,319,119	1,917,866	→ Pune , Mumbai
Coromandel International Limited	652,769	829,246	→ Secundarabad, Telangana
Gujarat State Fertilizers Company Ltd.	353,041	368,435	→ Vadodra
Zuari Agro Chemicals Ltd.	338,942	340,785	→ Goa
Tata Chemicals Ltd.	231,241	236,440	→ Mumbai
Paradip Phosphates Limited	296,512	221,863	→ Paradeep, Orissa
Fertilizers & Chemicals Travancore Ltd.	129,732	217,288	→ Kochi, Kerala
Mangalore Chemicals & Fertilizers Ltd.	138,994	146,148	→ Bengaluru
Deepak Fertilizers & Petrochemicals Ltd.	48,147	97,707	→ Panchkula, haryana
Greenstar Fertilizers Pvt. Ltd.	24,571	39,181	→ Thoothukudi, Tamil Nadu
Madras Fertilizers Limited	8,410	20,263	→ Chennai
Indian Potash Limited	10,555	0	→ Chennai
Grand Total	**3,552,033**	**4,435,222**	

Total Value & Volume of Exports in India

Total Value	Total Quantity
$22,265,036	56,384,673

Average price per unit	Average value per shipment
$0.39	$45,532

Top Suppliers

Indonesia	$13,152,216
South Korea	$5,267,263
Saudi Arabia	$934,917

Top Ports of Discharge

Tuticorin Sea	$18,403,121
Nhava Sheva Sea	$3,048,990
Chennai Air Cargo	$192,606

India is the largest country importing Phosphoric acid in the world accounting for over 45% of world trade. The country uses Phosphoric acid primarily for manufacturing of Fertilizers e.g.

Di-Ammonium Phosphate (DAP),

Mono-Ammonium Phosphate (MAP),

Triple Superphosphate (TSP),

Single Superphosphate (SSP)

Further Phosphoric acid is also used in the non-fertilizer sector of India i.e. as a food additive and acidifying agent in food and beverage industry, as an intermediate for producing phosphates that are utilized for water and metal treatment, for producing chemicals used in pharmaceutical and detergents industries. Out of the various usages, Fertilizer segment consumes more than 90% of Phosphoric Acid in India.

SOURCES OF IMPORTS

Most of the cargo is imported from countries e.g. Morocco, Senegal, Morocco, Jordan, Tunisia etc. Almost all the cargoes are fixed through annual contracts between the supplying nations and the Indian companies and there is very little activity happening in the spot shipping market.

PRICES -INTERNATIONAL

LONDON (ICIS)--International phosphate prices are holding firm and in many instances increasing on the back of healthy demand, tightness and rising feedstock costs.

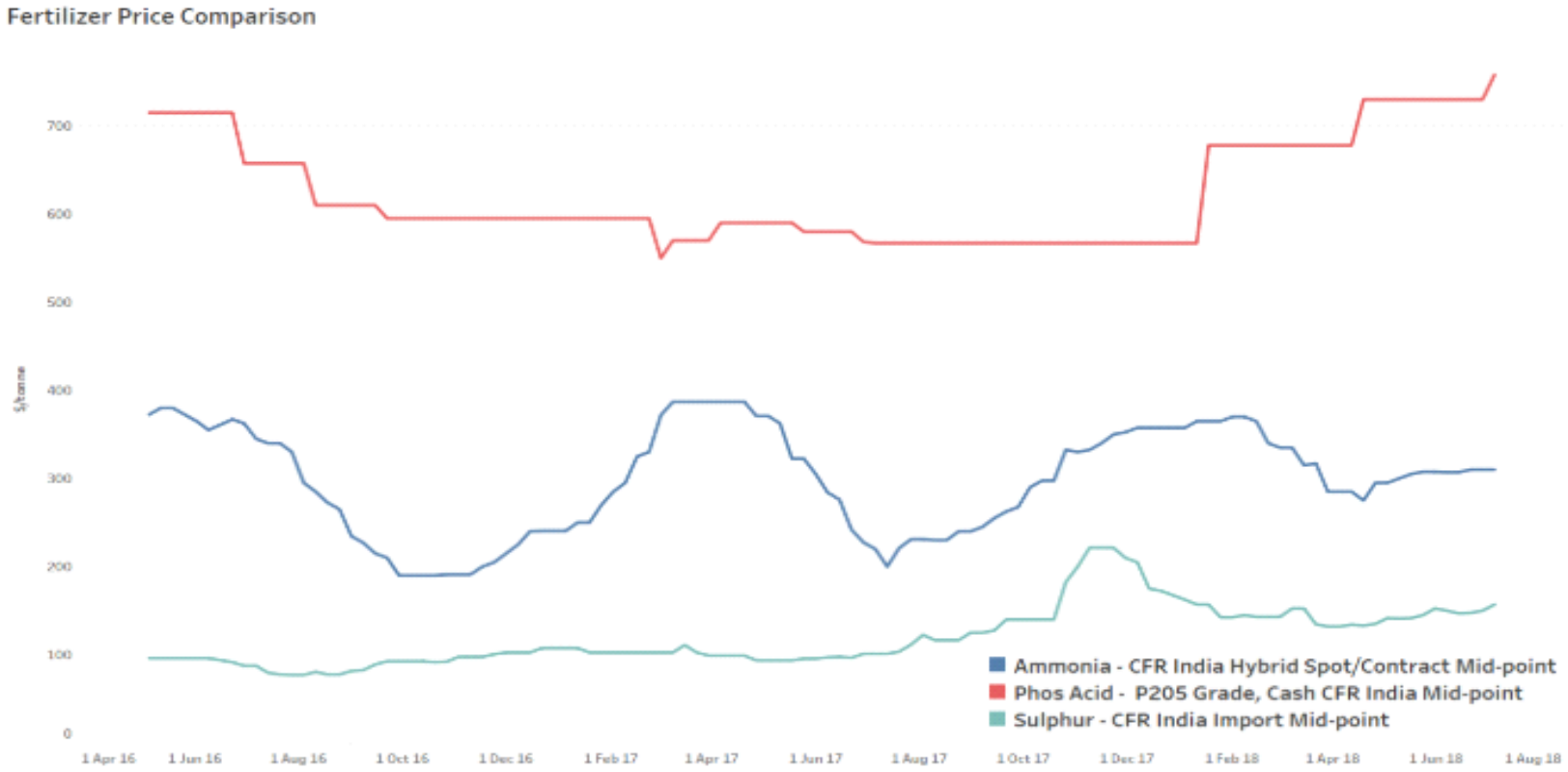
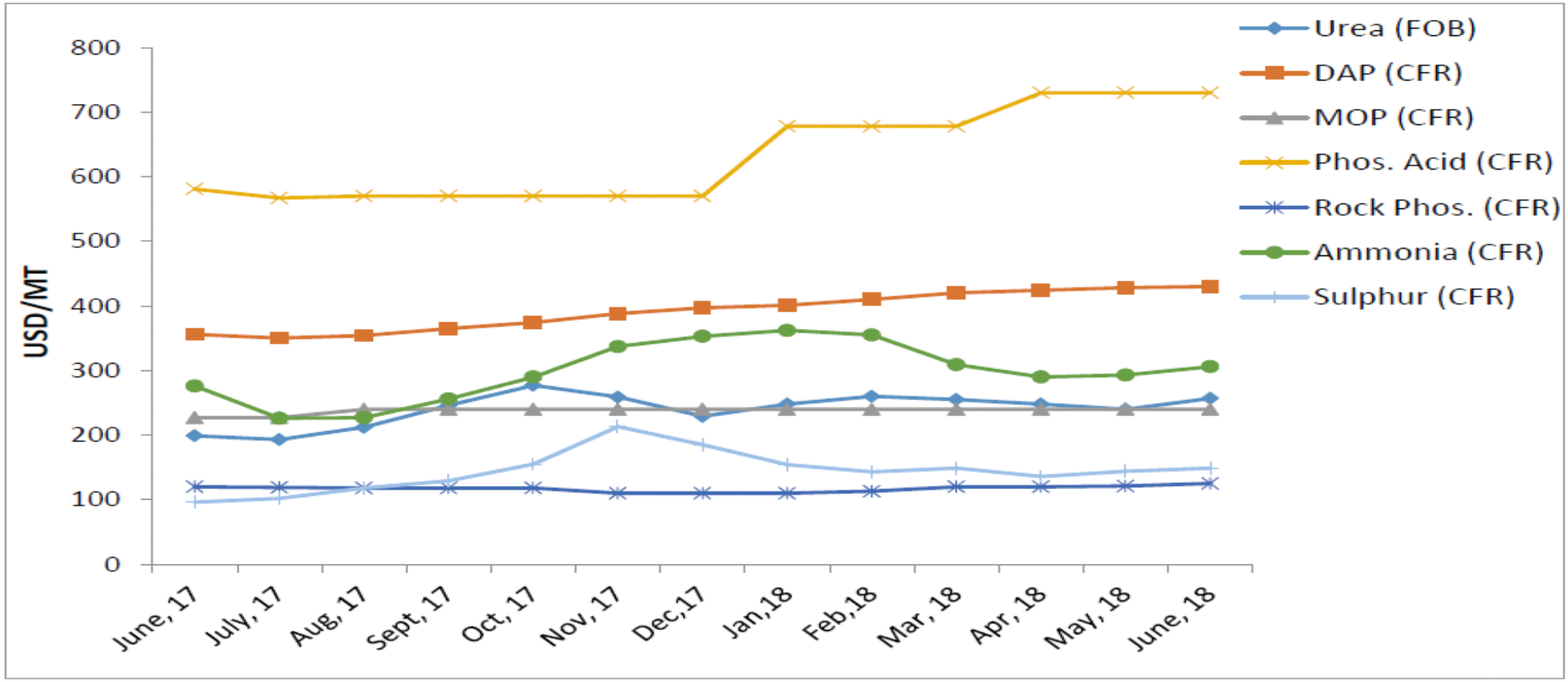


Diagram-1: Trend in International prices of Fertilizers since June, 2018



F. No. 11017/1/2017-M&E
Government of India
M/o Chemicals and Fertilizers
D/o Fertilizers
(E&S Wing)
***

Monthly Bulletin for the month of June, 2018

The highlights in Fertilizer Sector for the month of June, 2018 are as follows:

A. Trend in International prices of fertilizers

The trend of average International prices of fertilizers since June, 2017 and comparison of prices in June, 2018 over June, 2017 are as follows:

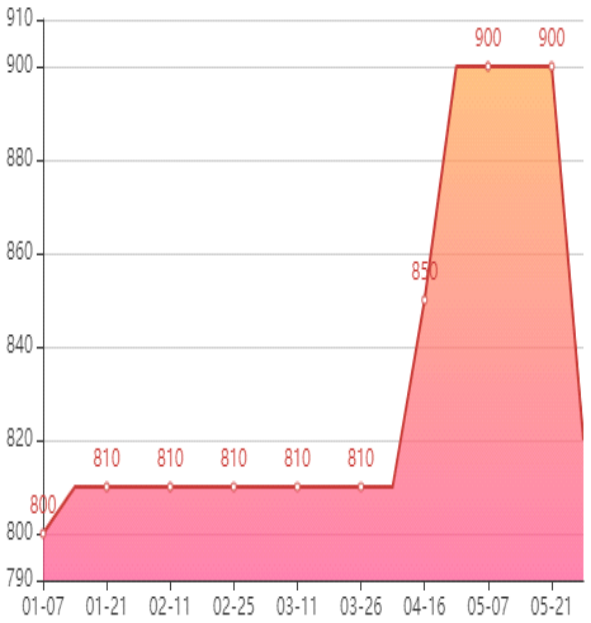
(Fig. in USD/MT)

Month	Urea (FOB)	DAP (CFR)	MOP (CFR)	Phos. Acid (CFR)	Rock Phos. (CFR)	Ammonia (CFR)	Sulphur (CFR)
June, 17	199	356	227	581	120	276	96
July, 17	193	350	227	567	119	226	102
Aug, 17	212	354	240	570	118	227	118
Sept, 17	246	365	240	570	118	256	129
Oct, 17	277	374	240	570	118	290	155
Nov, 17	259	388	240	570	110	337	213
Dec, 17	229	397	240	570	110	353	185
Jan, 18	248	401	240	678	110	362	154
Feb, 18	260	410	240	678	113	355	143
Mar, 18	255	420	240	678	120	309	149
Apr, 18	248	424	240	730	120	290	136
May, 18	240	428	240	730	121	293	144
June, 18	257	430	240	730	125	306	149
% change in June, 18 over June, 17	29.1%	20.8%	5.7%	25.6%	4.2%	10.9%	55.2%

Source: CRU Fertilizer Week.

Phosphoric Acid Price Analysis CAS No.: 7664-38-2 (Update on 2019-07-02)

Price Chart



6 Months / 3 Months / Month

Reference Price	$820/MT (Latest Price) $900/MT (Previous Price)
Change	$80.0/MT▼

Date	Price	Change
2019-07-02	$820/MT	$80.0/MT▼
2019-05-21	$900/MT	$0.0/MT
2019-05-14	$900/MT	$0.0/MT
2019-05-07	$900/MT	$0.0/MT
2019-04-30	$900/MT	$50.0/MT▲
2019-04-16	$850/MT	$40.0/MT▲
2019-04-01	$810/MT	$0.0/MT

Production

- Phosphoric acid (H3PO4) is produced by 2 commercial methods: wet process and thermal process
- Wet process phosphoric acid is used in fertilizer production.
- Thermal process phosphoric acid is of a much higher purity and is used in the manufacture of high grade chemicals, pharmaceuticals, detergents, food products, beverages, and other nonfertilizer products .

WET Process

- Wet Process of Production of Phosphoric Acid which Uses Sulphuric AcidIn a wet process facility , phosphoric acid is produced by reacting sulfuric acid (H2SO4) with naturally occurring phosphate rock.
- The phosphate rock is dried, crushed, and then continuously fed into the reactor along with sulfuric acid. The reaction combines calcium from the phosphate rock with sulfate, forming calcium sulfate (CaSO4), commonly referred to as gypsum. Gypsum is separated from the reaction solution by filtration.
- Facilities in the U. S. generally use a dihydrate process that produces gypsum in the form of calcium sulfate with 2 molecules of water (H2O) (CaSO4 2 H2O or calcium sulfate dihydrate).
- Japanese facilities use a hemihydrate process that produces calcium sulfate with a half molecule of water (CaSO4 ½ H2O). This one-step hemihydrate process has the advantage of producing wet process phosphoric acid with a higher P2O5 concentration and less impurities than the dihydrate process
- Due to these advantages, some U. S. companies have recently converted to the hemihydrate process. However, since most wet process phosphoric acid is still produced by the dihydrate process, the hemihydrate process will not be discussed in detail here.
- A simplified reaction for the dihydrate process is as follow:

Ca (1) 3(PO4)2 3H2SO4 6H2O → 2H3PO4 3[CaSO4 2H2O]↓

- In order to make the strongest phosphoric acid possible and to decrease evaporation costs, 93 percent sulfuric acid is normally used. Because the proper ratio of acid to rock in the reactor is critical, precise automatic process control equipment is employed in the regulation of these 2 feed streams.
- During the reaction, gypsum crystals are precipitated and separated from the acid by filtration. The separated crystals must be washed thoroughly to yield at least a 99 percent recovery of the filtered phosphoric acid.
- Wet process phosphoric acid normally contains 26 to 30 percent P2O5. In most cases, the acid must be further concentrated to meet phosphate feed material specifications for fertilizer production.
- Depending on the types of fertilizer to be produced, phosphoric acid is usually concentrated to 40 to 55 percent P2O5 by using 2 or 3 vacuum evaporators.

Product Analysis

	Typical
H_3PO_4	85%
P_2O_5	61%
Heavy metals	<10ppm
Organic matter	40 ppm
Insoluble matter	<23 ppm
pH (0.1% solution)	2.3

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Some important notes and Business Recommendation

- About Vedanta Tuticorin plant

A significant amount of the sulphuric acid is consumed by our phosphoric acid plant in the production of phosphoric acid, and the remainder of the sulphuric acid is sold to fertilizer manufacturers and other industries.

Phosphoric acid at our phosphoric acid plantis made by chemical reaction of sulphuric acid and rock phosphate, whichis imported.

Sulphuric acid is used as a starting material for phosphoric acid. Approximately 2.8 tons of sulphuric acid are required for the production of one ton of phosphoric acid.

By productsof tuticorin plant are about 10 lakh tonnes of sulphuric acid and nearly half this is used to make about 2 lakh tonnes of phosphoric acid. These are used by domestic industries, including chemicals and fertiliser units. With the expansion, the output of these acids will also go up.

- Thermal process of manufacturing Phosphoric Acid is a Greenfield project while Wet Process of manufacturing requires Sulphuric Acid in a huge quantity, thereby suppressing the costs of manufacturing Phosphoric Acid and hence less expenditure for phosphoric acid production, thus
- Can also look for Acid slurry for manufacturing as there would be no cost involved and manufactures same as the process of Sulphuric Acid Just with high So3 Content
- More Internet reach which can be developed through Digital Marketing Such As SEO, Google Adwords, E-mail marketing which can also be used to generate leads and hence grow business.
- Rock Phosphate which is imported , we need to look upon their pricing . Most of the other Dealers usually import rock Phosphate.
- Phosphoric Acid manufactured is 90% consumed by Fertilizer industry only.


Thank You!