

The mass is then quenched and solidified sulphur globules together with the gangue are allowed to fall in a column of water in a specially designed separator, whereby the globules get separated from the gangue in settling tanks and can be used over and over again. The sulphur recovered is more than 99% pure. The recovery is about 90-95%.

The equipment required consists of the following : jaw crusher, ball mill, electric motors, galvanised iron sheet tanks, melting pans, separators, furnaces, sieves and driers, settling tanks, and generators.

The process is covered by Pakistan Patents 107149 and 108018

### Pre-Construction Cost Estimation

(Production Capacity = 1,500 tons per year)

<i>Capital expenditure :</i>	Rs.	
Equipment ..	72,000	
Building ..	30,000	
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	10,200	
<i>Running expenditure :</i>		
Raw Materials ..	1,97,375	
Direct Labour ..	45,000	
Power ..	30,000	
Contingencies ..	2,000	
Depreciation @ 15% ..	15,300	
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	2,98,675	
<i>Direct expenses :</i>		
Establishment ..	22,875	
Promotion of the project at ½ % on Rs. 1,80,000/- (running expenditure for 3 months plus capital expenditure) ..	4,500	
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	27,375	
Interest on capital @ 6% on Rs. 1,80,000	10,800	
Insurance @ 2½ % on Rs. 2,99,375 ..	7,485	
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Cost of production of 1500 tons of sulphur .. ..	3,35,335	
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Average cost Rs. 223/8/- per ton.		

### JUTOID WATERPROOF MATTING

Water-proofing of roofs is a necessity in a great many cases where light concrete, thatched roofings or damp-proof courses are used. Uptil now these demands have been met by importing certain products, which are a drain on the foreign exchange and are too high priced to be directly available to the masses or for the rehabilitation of displaced persons. A process has been evolved at the Central Laboratories of the Pakistan Council of Scientific and Industrial Research for the production of a cheap water-proof matting of jute fabric base and other indigenous raw materials with the help of simple equipment which can be locally fabricated.

This material has been tested to withstand the severity of temperatures of the order of 170°F. without any bleeding and has also been subjected to water-jet quenching for determining thawing effects. Besides, it has been exposed to local climatic conditions for considerable periods without appreciable deterioration.

The total estimated capital investment for a plant with an annual production capacity of 6,00,000 sq. ft. Jutoid matting is Rs. 1,29,291. The cost of production of the matting works out to 3½ annas per sq. ft. The prevailing prices for the material used for similar purposes fluctuate between 12 annas to a rupee per sq. ft.

### Pre-Construction Cost Estimation

<i>Capital expenditure</i>	Rs.
Equipment .. ..	9,900
Building .. ..	7,000
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	16,900
<i>Direct expenses :</i>	
	Rs.
Raw Materials .. ..	97,500
Direct Wages .. ..	9,900
Power .. ..	1,000
Contingencies .. ..	1,000
Depreciation at 10% on capital ..	1,690
<i>Indirect expenses :</i>	
Establishment .. ..	9,720
Promotion of the project at 2½% on Rs. 50,000 .. ..	1,250
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<i>Selling expenses</i> .. ..	4,200
<i>Insurance at 2½% on Rs. 41,275</i> ..	1,031
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	1,29,291

Total cost of producing 6,00,000 sq. ft. of Jutoid comes to Rs. 1,29,291.

Cost of production per sq. ft. 3 ½ annas.

### AIR ENTRAINING AGENT FOR THE PRODUCTION OF FOAM CONCRETE

Air entraining agents are employed for the production of light-weight concrete, used in factories for thermal insulation or where lightness is demanded irrespective of cost.

While there is a very substantial demand for light-weight concrete as a constructional material, particularly in factories, its use in the country is limited on account of the non-availability of air-entraining agents locally.

As a result of the work carried out in the Central Laboratories, a process has been developed for the production of an air-entraining agent from hair and other proteinous waste materials.

The total capital investment in a unit of production with a capacity of 125 gal. per day to give 2000 cu. ft. of light weight concrete is estimated to be about Rs. 17,000 with an average cost of Rs. 4/4/- per gal. of the air-entraining agent.

The process consists of the following unit operations: cooking under pressure and filtering.

#### Equipment and Raw Materials

Pressure cooker (150-litre capacity), plate and frame filter press with hand pump, tanks (200-litre capacity), and kettle (100-litre capacity).

#### Pre-Construction Cost Estimation

(Production capacity: 37,500 gal. per annum or 125 gal. per day)

<i>Capital expenditure</i>	Rs.	Rs.
Equipment ..	12,000	
Building ..	16,000	
		28,000
 <i>Direct expenses per annum</i>		
Raw materials ..	87,228	
Direct wages ..	7,920	
Containers ..	37,500	
Power ..	4,000	
Contingencies ..	5,000	
Depreciation @ 10% ..	2,800	
		1,44,448

#### Indirect expenses

Establishment ..	6,120
Promotion of the project @ 2 ½ % on Rs. 67,000 (capital expenditure plus running expenditure for 3 months)	1,675

<i>Selling expenditure</i> .. ..	7,795
<i>Interest on capital @ 4% on Rs. 67,000</i>	1,800
<i>Insurance @ 2 ½ % on Rs. 1,15,228</i> ..	2,680

Cost of production of 37,500 gals. per annum of air-entraining agents	1,59,603
Average cost-Rs. 4/4 per gal.	

### PRINTING AND OTHER OIL-BASED INKS

Printing and other oil-based inks are mainly composed of a pigment material and a vehicle, usually a drying oil, in which the pigment is distributed in a finely divided state. But to prepare a stable composition of the proper consistency, adhesion, flow, colour and brilliancy involves a specialised technique and rigid control of the process and formulation. The introduction of automatic printing machine demands still greater perfection and uniformity in ink composition. The manufacture of ink is, therefore, a highly developed art, but on account of its large and universal demand, good quality printing and other inks are produced in almost all advanced countries. Pakistan, however, does not have a well established ink manufacturing industry, with the result that almost all types of printing and other inks required in the country are being imported. Investigations were, therefore, taken up in the Central Laboratories of the Council of Scientific and Industrial Research on various types of oil-based inks, such as stamp cancelling, duplicating and news inks. As a result of these investigations it has been possible to evolve various compositions for these inks, which dry mainly by absorption. They are almost exclusively based on indigenous raw materials and compare favourably with the best quality imported inks of each of these categories.

The estimated demand of the various kinds of inks based on the figures of import is as given below :—

1. Postal ink ..	10,000 lbs.	approx.
2. Duplicating ink ..	50,000 "	"
3. News printing ink ..	100,000 "	"