

Adding to the mix

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RICE milling generates a by-product known as husk; this surrounds the paddy grain. During the milling of paddy, about 78% is received as rice, broken rice and bran. The remaining 22% is received as husk. This husk is used as fuel in the rice mills to generate steam for the parboiling process. The husk contains about 75% organic volatile matter, leaving 25% to be converted into ash during the firing process, known as rice husk ash (RHA). This RHA contains around 85-90% amorphous silica.

So, for every 1,000kgs of paddy milled, about 220kgs (22%) of husk is produced and when this husk is burnt in the boilers, about 55kgs of RHA is generated.

India is a major rice producing country and the husk generated during milling is mostly used as fuel in the boilers for processing paddy, producing energy through direct combustion and/or by gasification. About 20m tones of RHA is produced annually and is a great environment threat, causing damage to the land and the surrounding area in which it is dumped. Lots of ways are now being thought of for the disposing of RHA through commercial use.

The particle size of cement is about 100 microns. Voids can form in the concrete mixes, if curing is not done properly, this reduces the strength and quality of the concrete. Silica Master Batch MM2 — which is made out of RHA is much more finer than cement, having a very small particle size of 25 microns, so much so that it fills the interstices in between the cement in the aggregate. That is where the strength and density comes from and that is why it can reduce the

amount of cement in the concrete mix.

RHA is a good super-pozzolan (material with a high silica content of above 85%) and can be used to make special concrete mixes. There is a growing demand for fine amorphous silica in the production of special cement and concrete mixes, high performance, high strength, low permeability concrete, for use in bridges, marine environments, nuclear power plants etc. This market is currently filled by silica fumes or micro silica (very fine non crystalline silicon dioxide) being imported from Norway and also from Burma. Due to limited supply of silica fumes in India and the demand being high, the price of silica fumes has risen to as much as US\$800/t in India.

Silica Master Batch MM2 has the potential to be used as substitute silica fumes or micro silica at a much lower cost, without compromising on the quality aspect. Adding Silica Master Batch MM2 to the concrete mix, even in low replacement will dramatically enhance the workability, strength and impermeability of concrete mixes, while making the concrete durable to chemical attacks, abrasion and reinforcement corrosion, increasing the compressive strength by 10-20%.

Amorphous Silica
Rice husk is burnt in controlled temperatures which are below 700°C. The ash generated is amorphous in nature. The transformation of this amorphous state to crystalline state takes place if the ash is exposed to high temperatures of above 850°C.

Green concrete
Green concrete, as the name suggests, is eco friendly and

saves the environment by using waste products generated by industries in various forms like rice husk ash, micro silica etc, to make resource-saving concrete structures. Use of green concrete is very often cheap to produce as it uses waste products directly as a partial substitute for cement, thus saving energy consumption in production per unit of cement. Above all, green concrete has greater strength and durability than normal concrete.

Other uses of rice husk ash

RHA acts as a very good insulator and is used for the insulation of molten metal in tundish and ladle in slab caster. The temperature of molten metal in the ladle is around 1400°C+. When this metal flows from ladle to tundish, the temperature drops to around 1250°C. This reduction in temperature leads to choking and causes breakdown in the slab caster. When RHA is spread as a coating over the molten metal in the tundish and ladle, the temperature is maintained and



Rice husk ash.

does not cool down quickly, hence reducing the breakdown time of the casting.

Technical specifications

SiO₂, Silica: 85% minimum
Humidity: 2% maximum
Particle size: 25 microns
Colour: Grey
Loss on ignition at 800°C: 4% maximum
pH value: 8

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Particle Size , Mesh Size and Grit No.			
I.S.Specification	British Standard	American Standard	Grit No
IS.460.62	Specification.BS.410.60	Specification.ASTM.E 11.79	
5.60 mm	3 mesh	No.3	-
4.75 mm	31 mesh	No.4	-
4.00 mm	4 mesh	No.5	-
3.35 mm	5 mesh	No.6	-
2.80 mm	6 mesh	No.7	-
2.36 mm	7 mesh	No.8	-
2.00 mm	8 mesh	No.10	-
1.70 mm	10 mesh	No.12	-
1.40 mm	12 mesh	No.14	-
1.18 mm	14 mesh	No.16	-
1.00 mm	16 mesh	No.18	-
850 microns	18 mesh	No.20	-
710 microns	22 mesh	No.25	24
600 microns	25 mesh	No.30	30
500 microns	30 mesh	No.35	36
425 microns	36 mesh	No.40	-
355 microns	44 mesh	No.45	46
300 microns	52 mesh	No.50	54
250 microns	60 mesh	No.60	60
212 microns	72 mesh	No.70	70
180 microns	85 mesh	No.80	80
150 microns	100 mesh	No.100	90
125 microns	120 mesh	No.120	100
106 microns	150 mesh	No.140	120
90 microns	170 mesh	No.170	-
75 microns	200 mesh	No.200	150
63 microns	240 mesh	No.230	180
53 microns	300 mesh	No.270	220
45 microns	350 mesh	No.325	-
38 microns	400 mesh	No.400	300
32 microns	450 mesh	-	340
25 microns	500 mesh	-	380
20 microns	635 mesh	-	450