PyroWater Utilizer

Converts waste water (Moisture) generated from Tyre Pyrolysis plant into fuel and burns it in the furnace in place of wood!

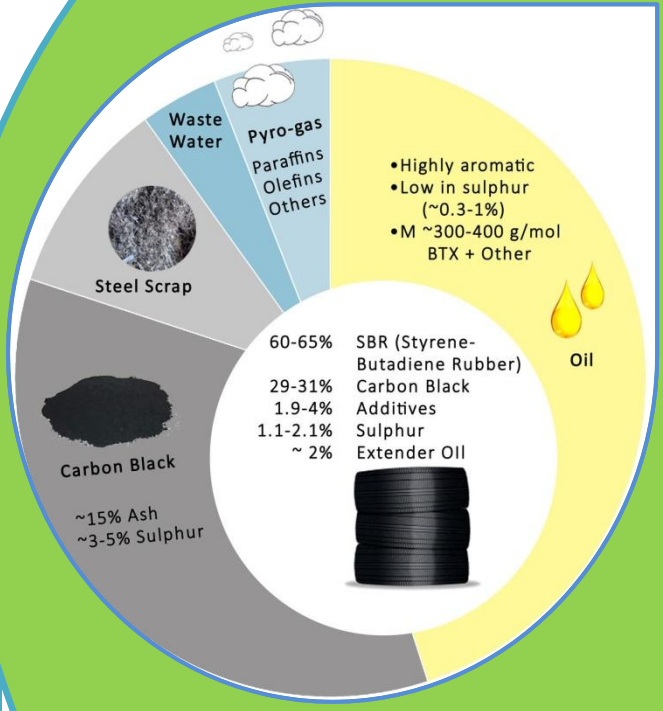
truly green energy

Why PyroWater Utilizer?

Tyre pyrolysis is a method for recycling used tyres which heats shredded or whole tyres in a reactor vessel containing an oxygen free atmosphere. Pyrolysis is also known as thermal depolymerisation and carbonization. Tyre pyrolysis produces three principal products – pyrolytic gas, oil and carbon black. Oil and Carbon black are widely used as an energy source. Steel wire also has its industrial uses. But waste water has been a major problem so far. Some of the methods tried for using/disposing waste water are as shown below.

As seen from the table, almost everything possible has been tried but a complete solution has been eluding the industry. If the process of pyrolysis has to be carried out under even reasonable pollution control norms, at least 2 of the methods mentioned above have to be used in combination and cost of such measures would be almost equal to the cost of plant itself.

Methods Tried	Description	Reason for Failure
Sewerage Treatment Plant	Treatment of waste water	Attempts to treat unsuccessful because of composition of waste water.
Demulsification	Separating water and oil through demulsifying agents	Complete treatment is not possible.
Briquettes Making	Usage of waste water in place of binder	1. Process is very unhygienic. 2. Unbearable stench while manufacturing and burning. 3. Strength of briquette very weak. 4. Very little quantity of water used.
Filtration Bed	Filtration through sand beds	Complete filtration not possible. Replacement of sand becomes a cumbersome routine.
Evaporation through Boiling or Scrubber	Boiling or pouring in scrubber	Whole area is affected with stench. Unbearable.
Brushing with Sawdust Mix	Mixing waste water with sawdust, sun drying the mixture and using in furnace	1. Unbearable stench while mixing and drying. 2. Cumbersome process. 3. Very little quantity of water used.



Typical tyre pyrolysis process constituents chart

On the other hand, even if utmost care is taken in disposing the water, the toxicity of waste water remains. Decontamination of these polluted soil bed and water bodies is very difficult and expensive, and wouldn't result in restoration of their original properties. Dumping of waste water also results in loss of valuable energy. In a world where conservation of energy is the backbone for growth and development, wastage of energy is sinful.

Keeping in mind these factors, the idea was conceived to utilize the waste water generated from Pyrolysis process. Hence, **PyroWater Utilizer.**

How Does PyroWater Utilizer Work?

PyroWater Utilizer is based on two eminent technologies – Emulsion and Atomization. Emulsion is a process where oil and water are mixed to form and maintain a temporary suspension by reducing their particulate sizes. The suspension goes back over time to initial two-phase system where the materials separately exist as immiscible. The rate at which the emulsion returns to phase separation depends on types, viscosities, particulate size and composition of mixed materials and the temperature. Specifically, smaller particulate sizes, desirably reduced to submicron level, tend to help keep the liquid emulsified for a longer period.

Pyro Water Utilizer creates special condition for waste water which turns it into an efficient emulsion fuel. With a pH value of about 9.5, waste water is mainly a mixture of water and oil in ready-to-emulsify state. As it is widely known, high pH value provides for a better emulsion platform. In addition to this the inorganic constituents further enhance the emulsification process as they possess the quality of a surfactant. With the help of a high shear mixer, which creates different velocities throughout the water, and pressure in the fluid, water molecules and other constituents breakup in to smaller particles. This results in a stable and homogeneous nanoemulsion, good enough to be utilized within the period of process of Pyro Water Utilizer.

On reaching its emulsified stage, pyro water is sprayed into the burner. When air or required gas is injected through a tube with decreasing section, it speeds up generating a pressure drop at the narrowest point. While the dispersion is fairly viscous it still flows readily and does not have to be heated prior to supplying it to the burner. This is one of the advantages of the present invention as it permits eliminating heating equipment without eliminating its function. Then the gas/air combines with the liquid to provide a more readily combustible aerosol. Due to the increase in temperature, the water molecules further lose their viscosity and surface tension increasing the diffusion. Additionally this causes the rapid expansion and fragmentation of oil droplets, a process known as secondary atomization. . The flame thermal energy reduces the aerosol completely to release energy, completing the process of atomization.

In comparison to wood and coal, waste water fuel has a lower flash point. Further waste water fuel burns at much lower temperatures. The waste water that is not fully combustible even at 1000°c, completely burns at even 600°c with much lower emissions. Added to this usage of wood is reduced substantially. Low Temperature Combustion (LTC) is a reference to advance combustion concepts with the overall goal to reduce and/or alter advantageously NOx and soot formation.

Thus, PyroWater Utilizer not only eliminates the problems of disposal but also converts the waste water into useful energy.

Benefits of PyroWater Utilizer

Burning of waste water through PyroWater Utilizer

Saving:

Direct:

- Replaces up to 90% of wood
- Handling cost vs. Wood is reduced
- Per cycle time is reduced due to greater heat
- Disposal cost is completely eliminated

Indirect:

- Wood reduction reduces tree felling.
- Better use of scrap tyres compared to land filling
- Lesser efforts means healthier people

Pollution Control:

- Much lesser emissions compared to wood
- No ground water or soil pollution
- No air pollution because of stench

Hygiene:

- Clean, panel controlled operation
- Lesser handling of wood, lesser mess
- No stench because of evaporation

Convenience:

- No movement of material
- Easy start up and shut down
- Better handling of emergency

Technical Details

Power Consumption: Main unit:200 Watts
Capacity: 60 Ltr/Hr ± 10 (Depends on viscosity)
Current: 1.0 Amp
Size: 19.5 x 19.5 x 46 Inches
(These details do not include 5HP air compressors and pumps)

SAVINGS PER BATCH OF OPERATION (In Rupees)

No. of Hours PWU Used	Consumption of Wood in Kgs				
	2000	1700	1500	1200	1000
5	2250	1913	1688	1350	1125
6	2700	2295	2025	1620	1350
7	3150	2678	2363	1890	1575
8	3600	3060	2700	2160	1800
9	4050	3443	3038	2430	2025
10	4500	3825	3375	2700	2250

1. The above table is only indicative. Actual figures may vary.
2. Price of Wood is assumed to be Rs. 4.50 Per Kgs.
3. Minimum carbon content in the waste water is a must.
4. Subject to proper usage as per instructions.
5. Technical specifications may vary at the time of delivery.

Brought to you by:

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