RSC INTEREST GROUP
FORMULATION SCIENCE & TECHNOLOGY

Formative Formulation 2

Synthesis of high solar absorption material (activated carbon nanoparticles) to improve light-heat conversion ratio for solar desalination applications

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INTRODUCTION

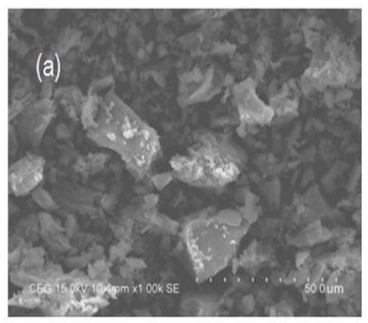
❖**Tremendous industrial growth and urbanization** have exploited the fresh water resource **extensively and scarcity of fresh water will be even worst in the upcoming years**. Among all the continents, **Asia is the highest water consumer** and it consumes around **2780 billion m^3 / year** water. In these regards, there is a strong need to explore the alternate opportunity to fulfill the global demand for fresh water.

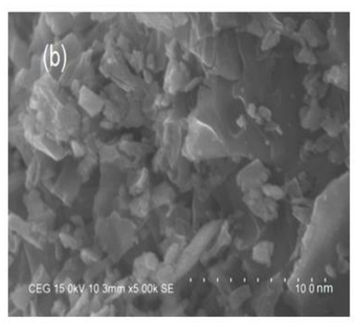
❖**Solar desalination system** has enormous potential to fulfill the **global freshwater demand** in economic and environment friendly manner

❖**Solar still can be an appropriate solution for potable water problem**

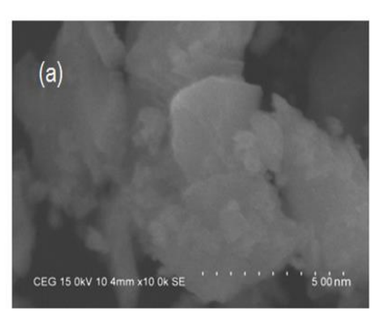
PREPRATION AND CHARACTERIZATION OF ACTIVATED CARBON (AC) NANOPARTICLES

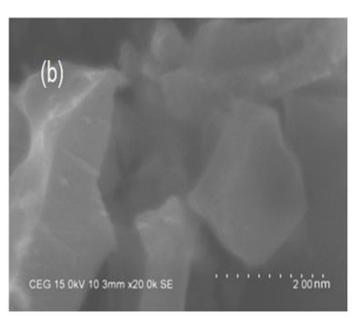
(a) Live Kigelia africana leaves (b) Dead leaves





SEM images of fine leaves powder before ball milling





SEM images of fine leaves powder after ball milling

❖**Pyrolysis of the dead leaves powder was done at a temperature 500°C in a muffle furnace.**

❖**Slow cooling of the pyrolysis leaves to room temperature, helped getting the desired carbon nanomaterial with preferred porosity**

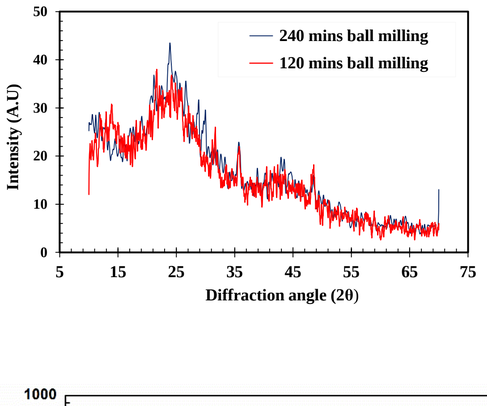
PREPRATION OF AC COATED ABSORBER AND EXPERIMENTAL SETUP

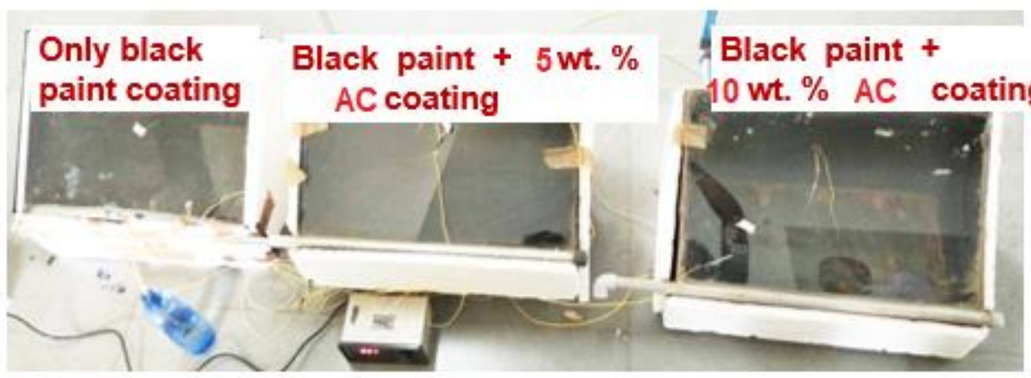
➢**AC is taken in the weight ratio of 5 and 10 %. Black oil paint and turpentine (4:1) along with AC was mixed**

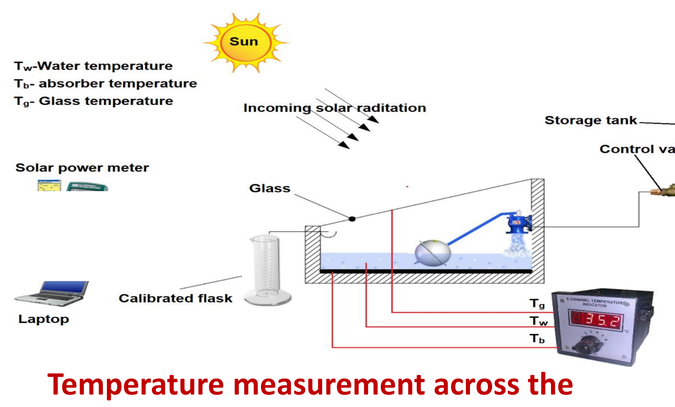
➢**Solution of AC with black paint was stirred: 300 rpm, 1h for achieving black nano-paint**

➢**Nanopaint coating- Spray gun (High volume, LP)**

- ❖Metal Primer
- ❖Gun nozzle: 1.4 mm
- ❖Air Consumption : 6 CFM
- ❖Sand paper : 220 – grit
- ❖Drying Hour : 4 h

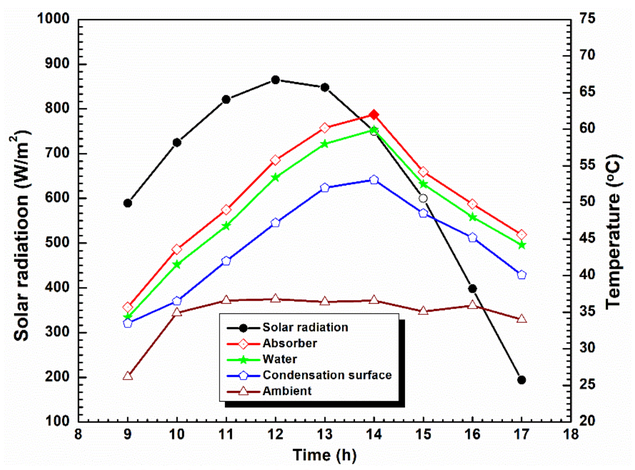




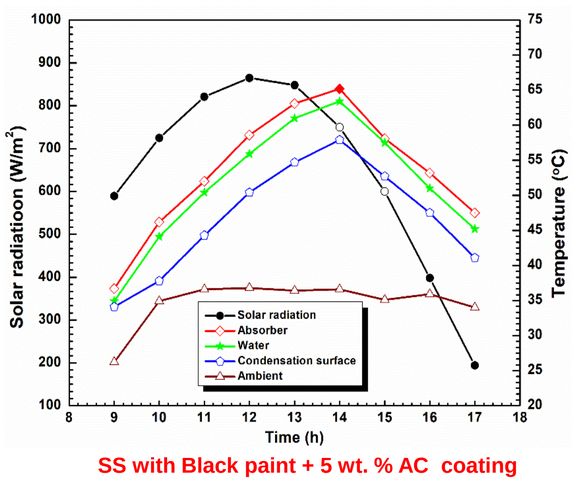


Temperature measurement across the absorber, glass and water in Solar Still

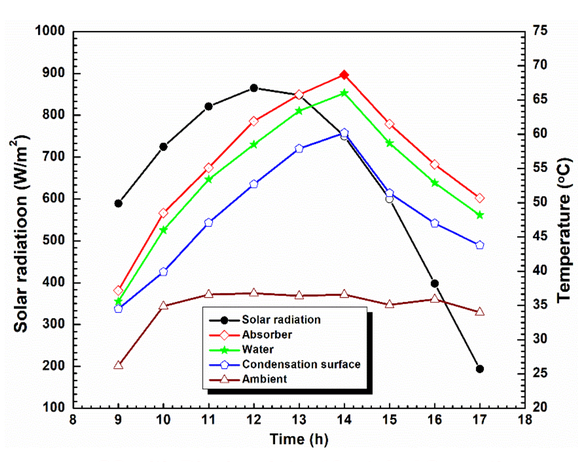
EFFECT OF AC COATED ABSORBER ON THERMAL PERFROMANCE OF SOLAR STILL



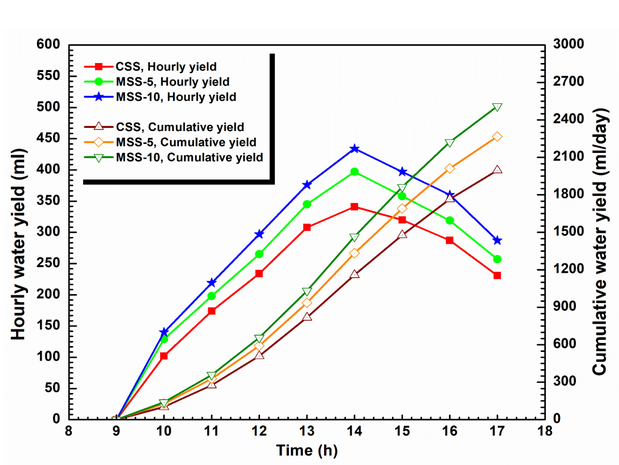
SS with Only Black paint coating



SS with Black paint + 5 wt. % AC coating



SS with Black paint + 10 wt. % AC coating



Fresh water produced

CONCLUSIONS

❖ **SS with only black paint coated Absorber, the peak temperature of the glass, water and absorber was found to be 53.1 °C, 59.9 °C and 62 °C, respectively.**

❖ **With 5 wt.% AC, the maximum temperature of the glass, water, and absorber was 57.9 °C, 63.4 °C and 65.2 °C, respectively.**

❖ **With 10 wt.% AC, the maximum temperature of the glass, water, and absorber was 60.2 °C, 66 °C and 68.7 °C, respectively**

❖ **SS with only black paint coated AP shows the full day yield of 1997 ml/day. 5 wt. % and 10 wt. % AC significantly augmented the yield by 13.5% and 25.7%.**