



Purification of biogas using activated carbon obtained from local biomass wastes

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Outline

- Introduction ○
- Project's Main Idea
- Objectives
- Activated carbon production
- Adsorption
- Experimental work
- Results and analysis
- Conclusion

○

Introductio





Kitchen Waste



Animal Manure



Agriculture Residue



Industrial Waste

Filter

Bio Gas

Bio Gas

Bio Slurry

Biogas Plant



Cooking



Heating + Lighting



Electricity

Bio Fertilizer



Green Agriculture

Composition of biogas from different sources

Component	Household Waste	Wastewater Treatment Plant Sludge	Agricultural Waste
CH ₄ vol%	50 - 60	60 – 75	60 - 75
CO ₂ vol%	34 - 38	19 – 33	19 – 33
N ₂	0 - 5	0 -1	0 -1
O ₂ vol%	0 -1	< 0.5	< 0.5
H ₂ O vol%	6	6	6
H ₂ S mg /m ³	100 - 900	1000 – 4000	3000-10000

Effects of H₂S in Biogas





Adsorption using activated

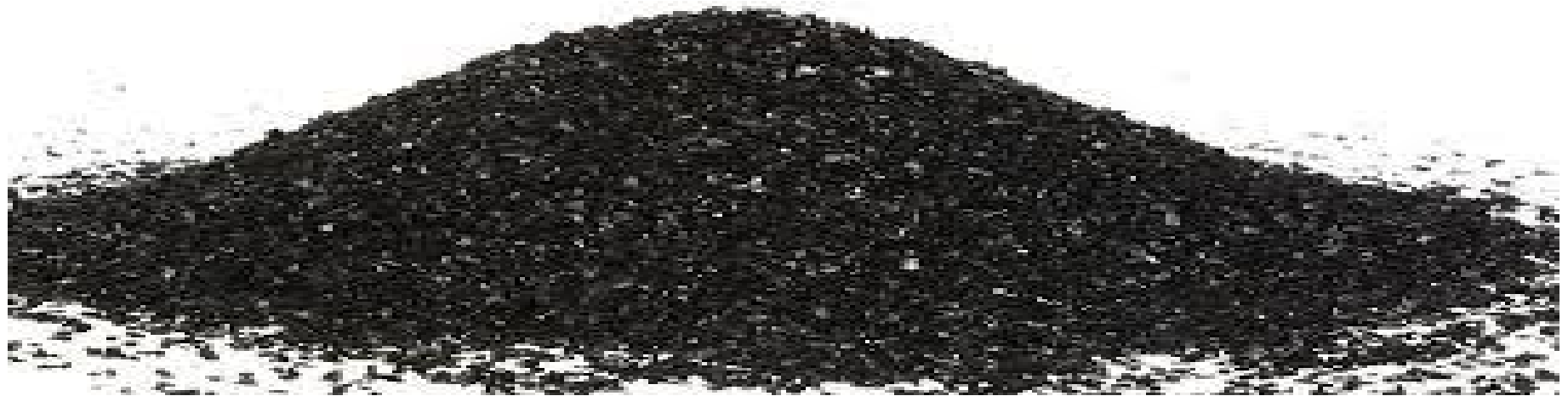


Objectives

- ✓ To **prepare AC** from local biomass wastes.
- ✓ To **purify biogas** from H₂S.
- ✓ To study the **effects of operating conditions** on the



Activated

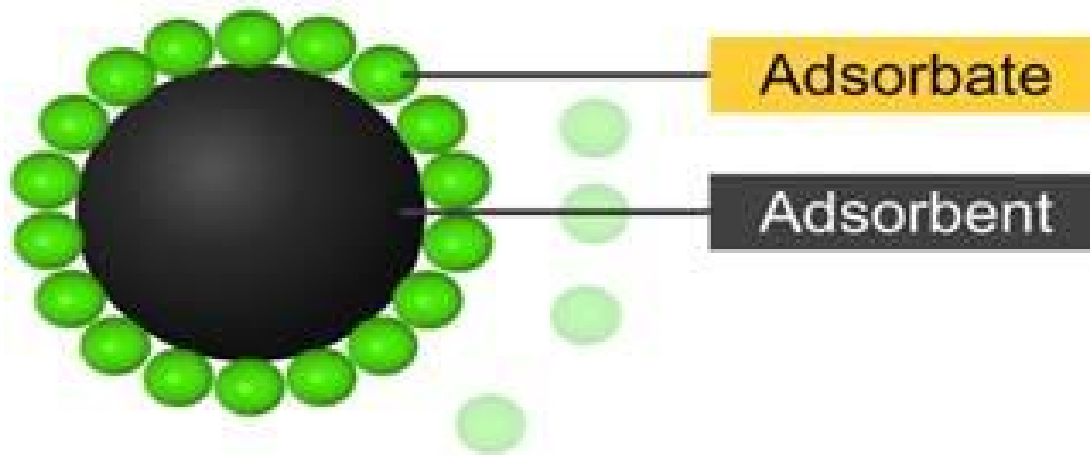




Slow pyrolysis
1-4 hours
500-950 °C



Adsorption

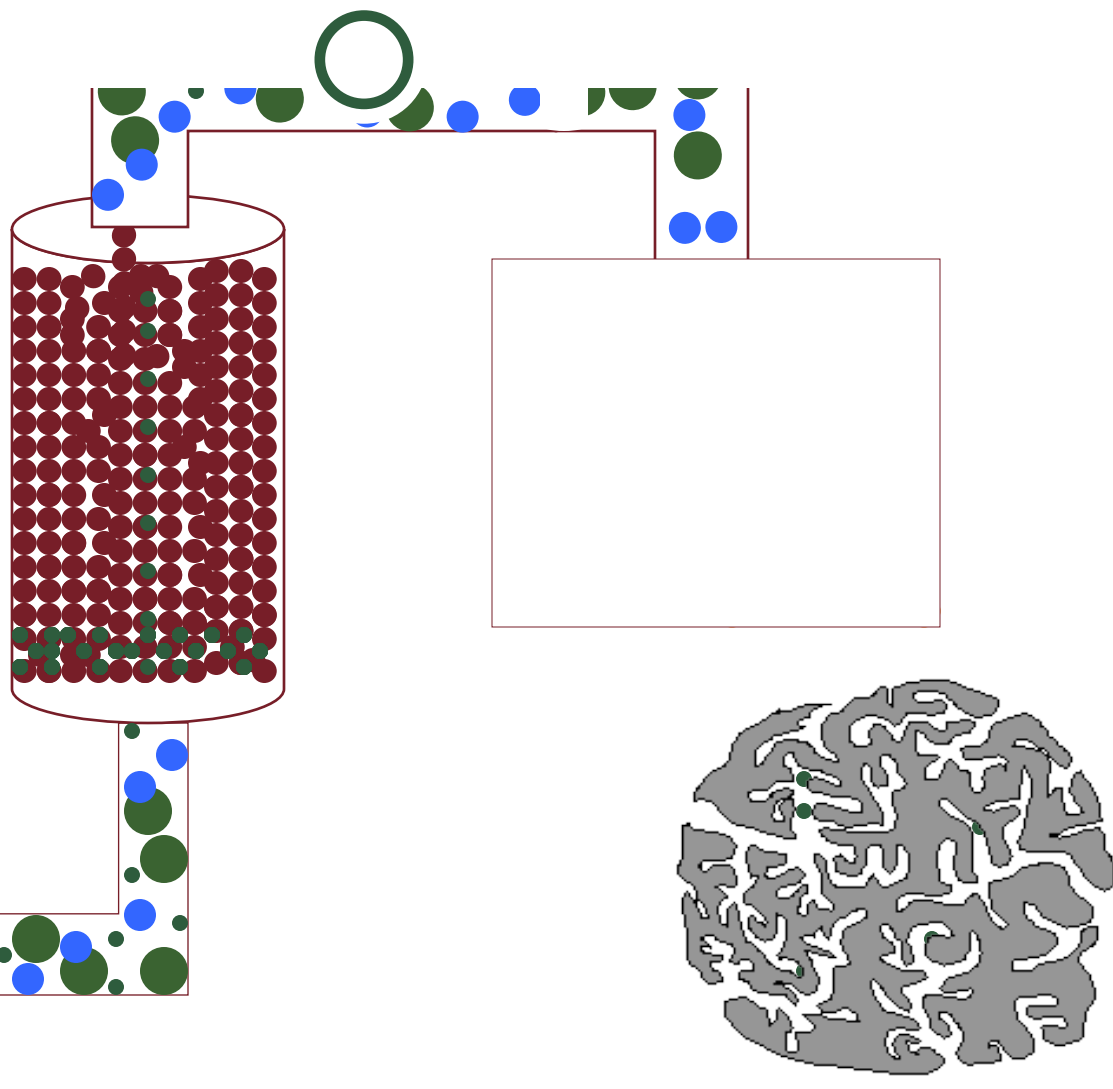


● CH₄

● CO₂

● H₂S

● AC

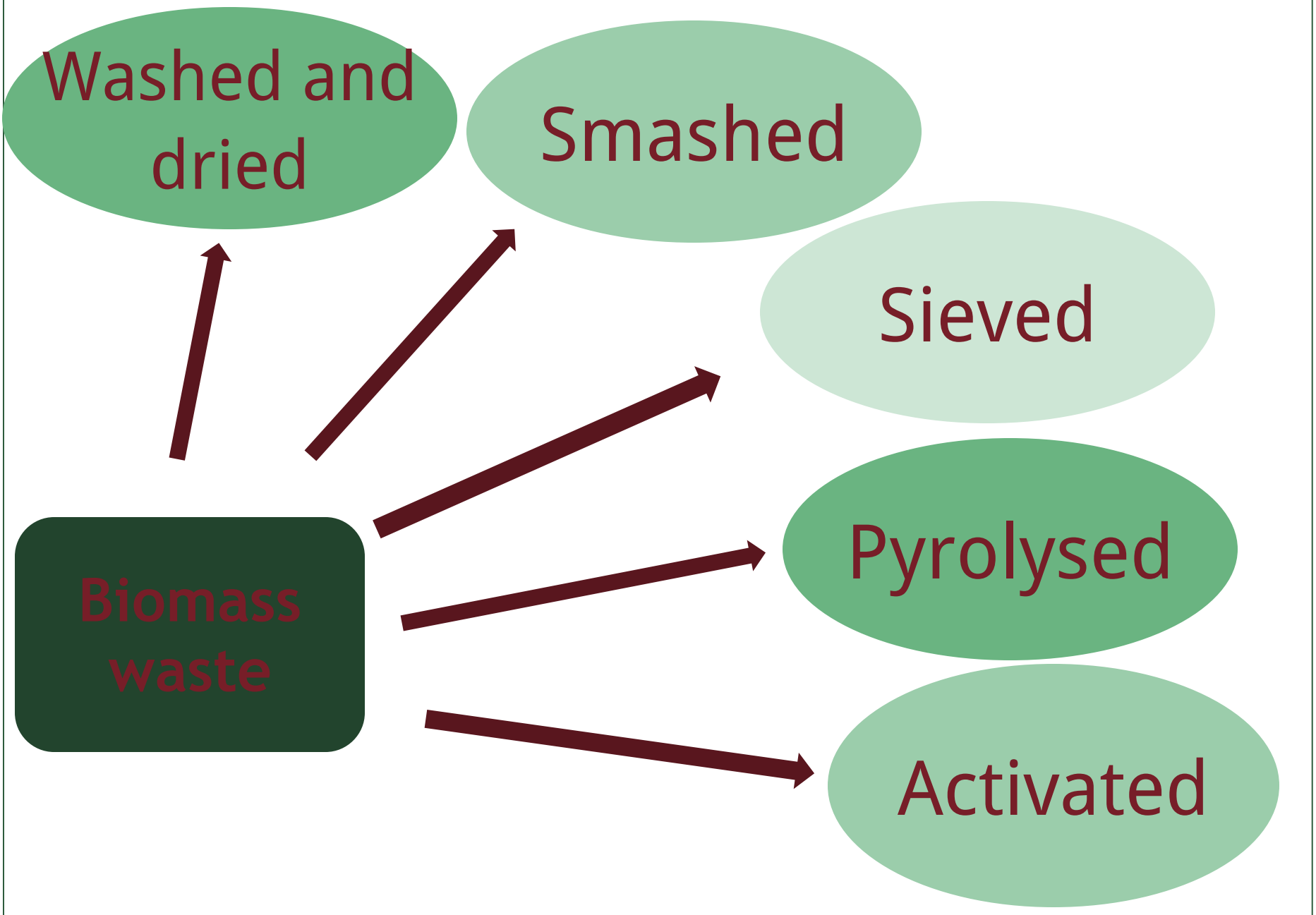




Experimental

Three types of biomass





Washed and
dried

Smashed

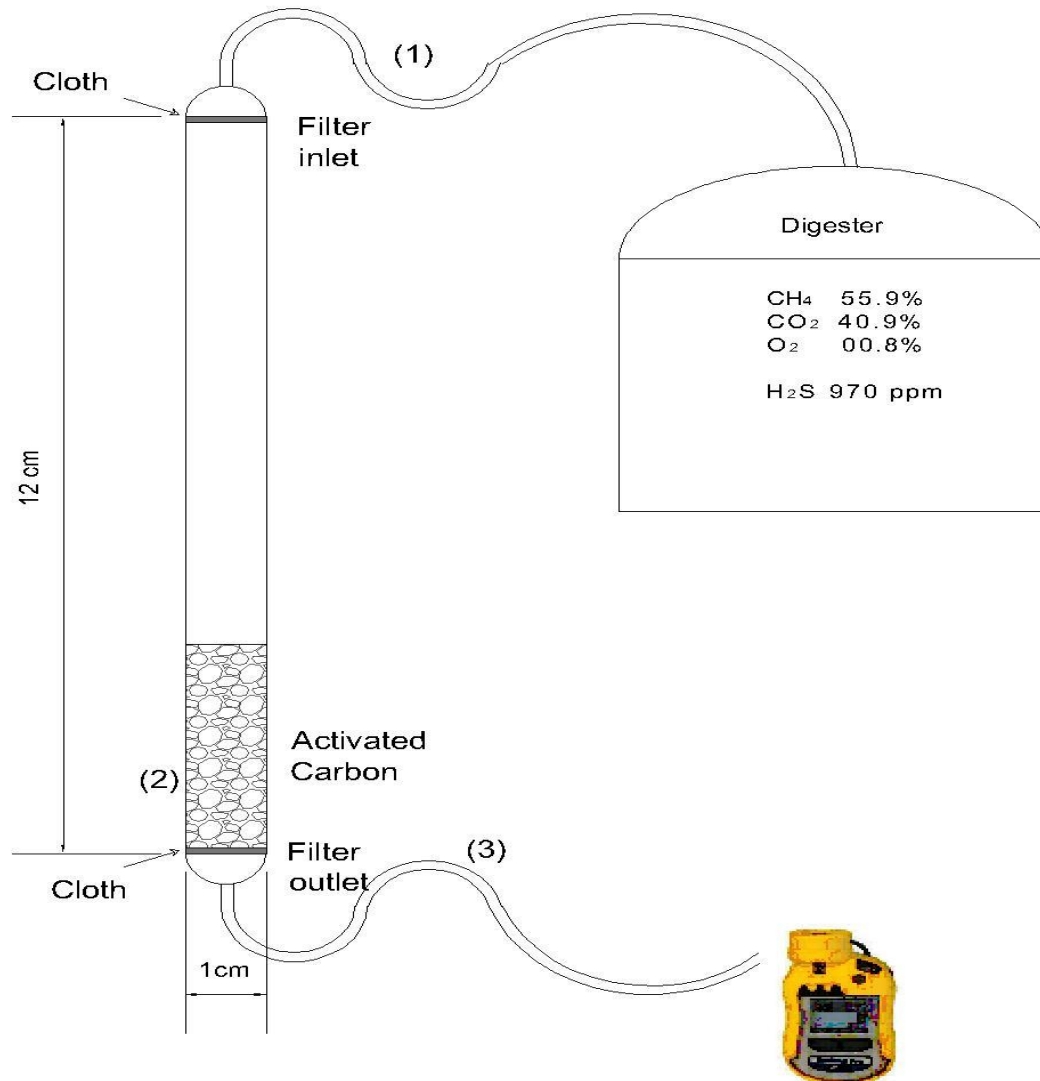
Sieved

Pyrolysed

Activated

Biomass
waste

Adsorption



Results

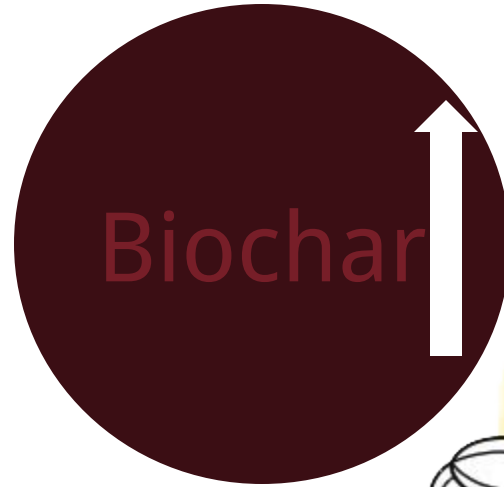
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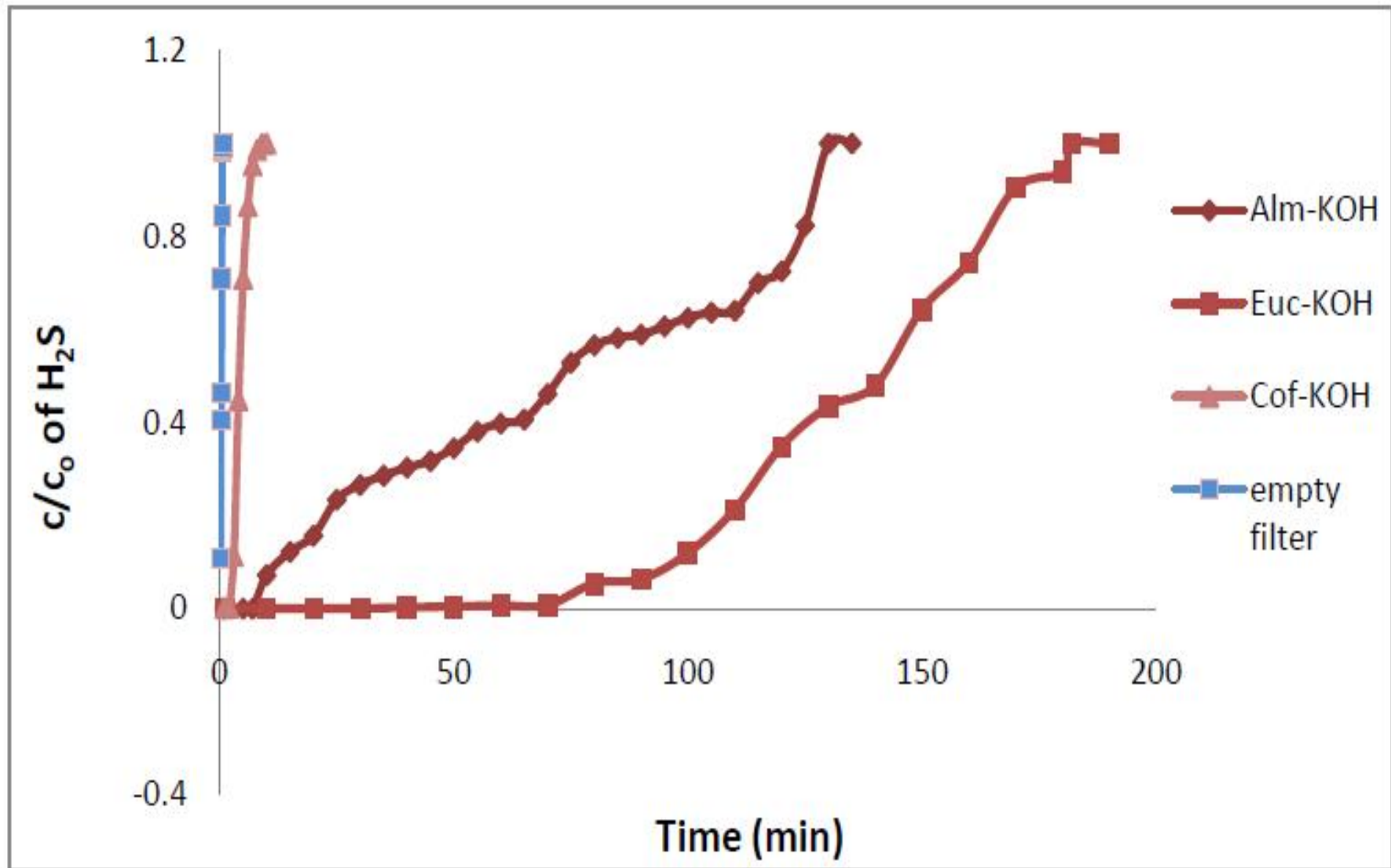


Biomasses yield from pyrolysis

Biomass	Yield (%)
Eucalyptus	35
Almond shells	28
Coffee grains	23

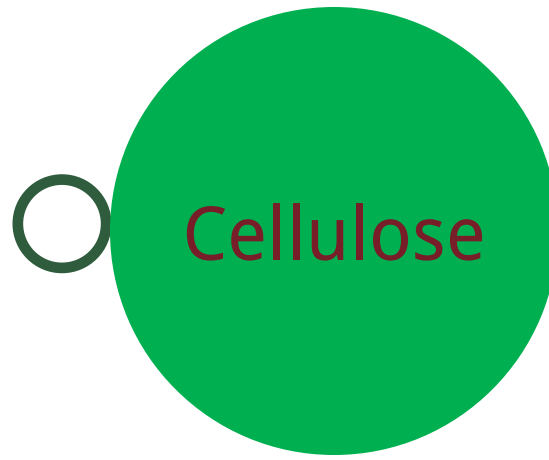


Biomass	Lignin content (% w/w)	Cellulose content (%w/w)
Eucalyptus	28	59.8
Almond shells	20.4	50
Coffee grains	23	12





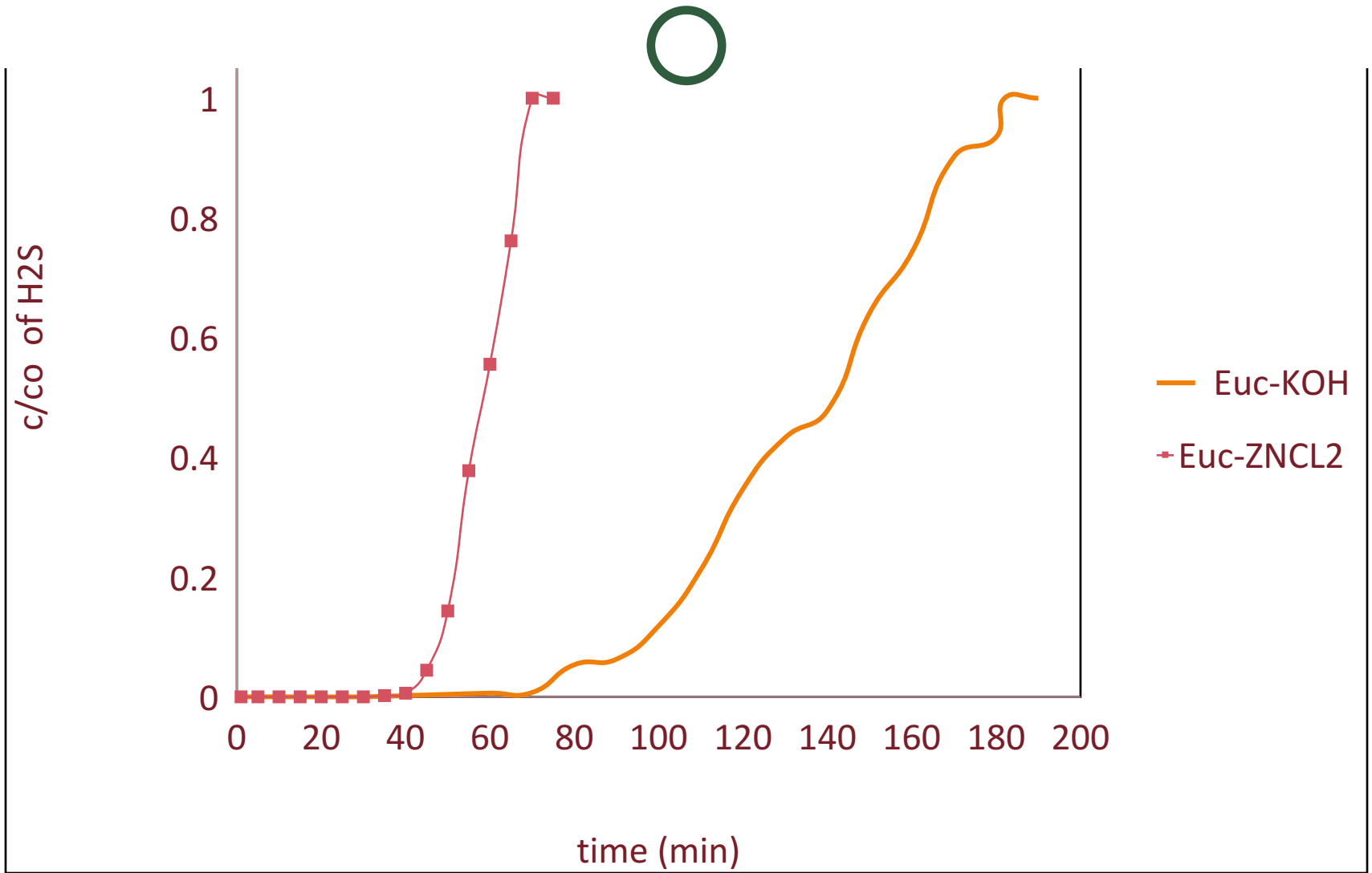
Macropores



Micropores

Adsorption takes place

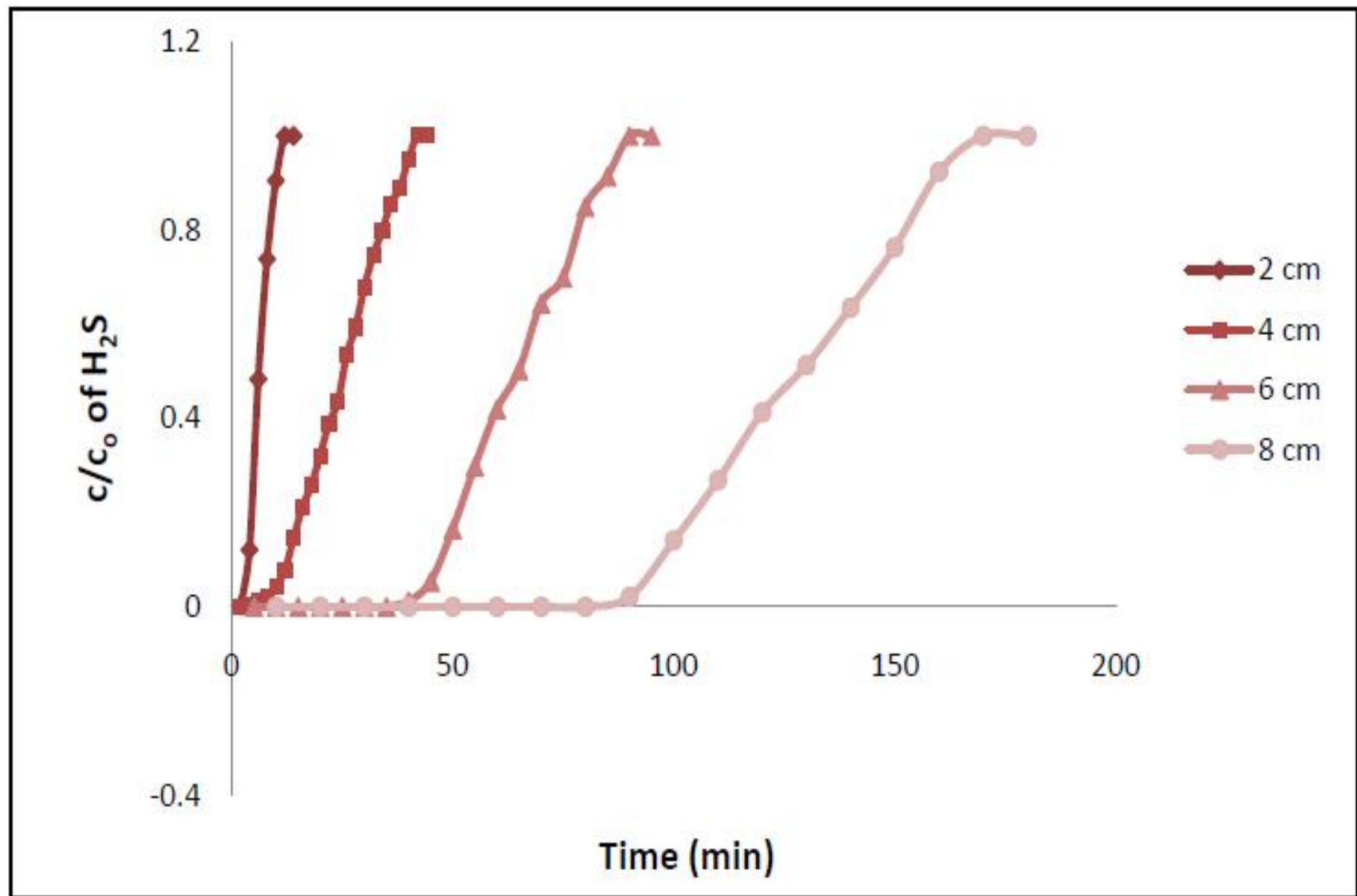


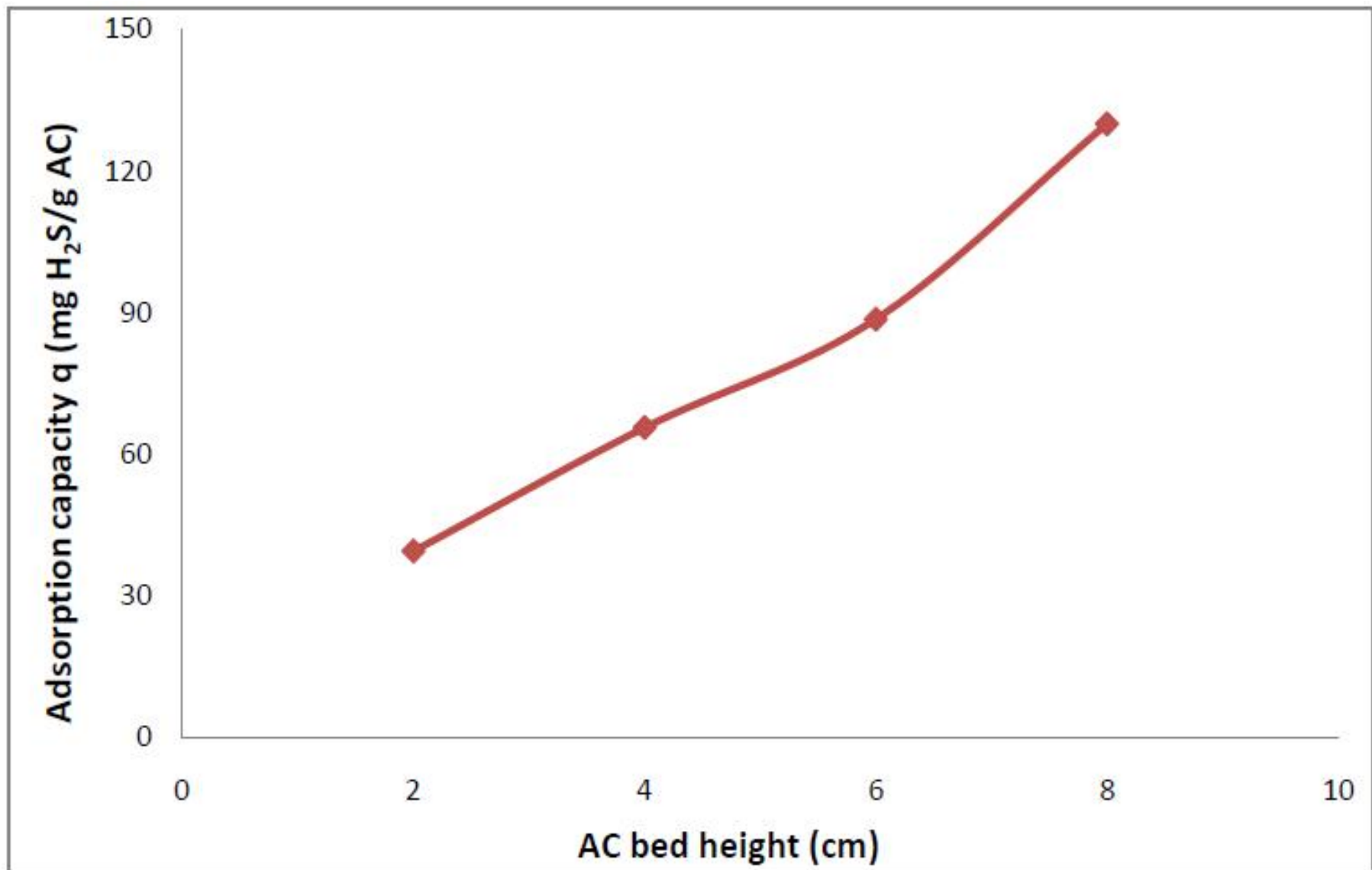




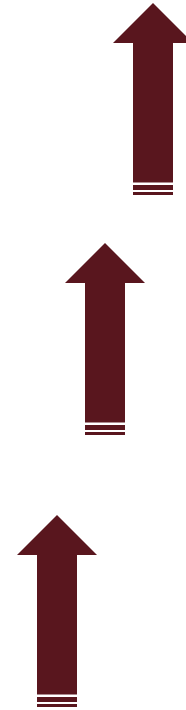
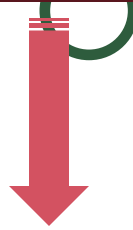
has higher affinity







Increasing bed height



Conclusion

Recommendations



THANK YOU

