Activated carbons derived from biocollagenic wastes of vegetable tanning from the leather industry. Prospects as adsorbent for H_2S removal

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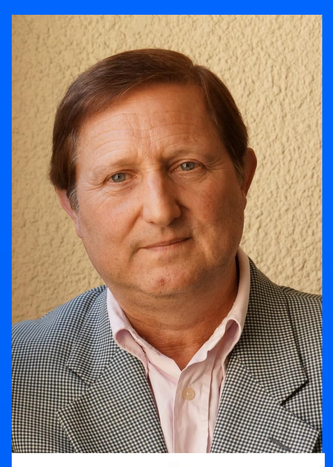


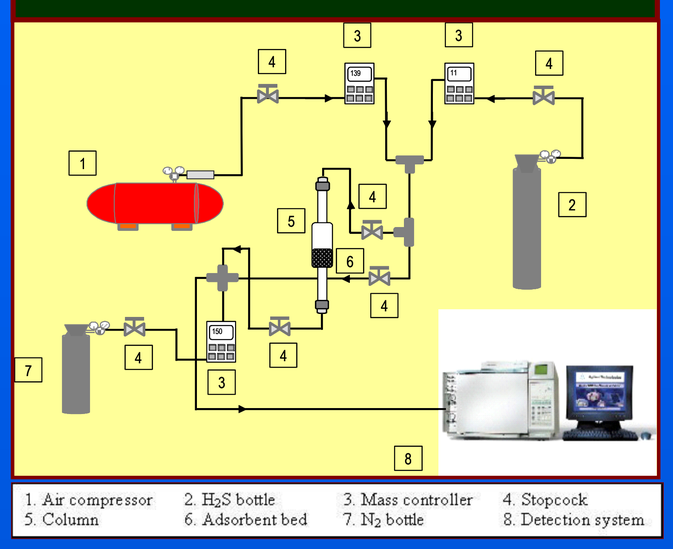
Introduction

❖ Hydrogen sulfide (H_2S) is a toxic gas that exists in the sludge from sewage treatment plants, landfills, etc. It is also present in the biogas as an impurity that must be removed in order to use the biogas as a fuel,.

❖This research is focused on two environmental issues: The use of biocolagenic wastes from the tanning industry as activated carbon precursors and, the employment of these adsorbents in H_2S removal, the main component generated in the EDARs.

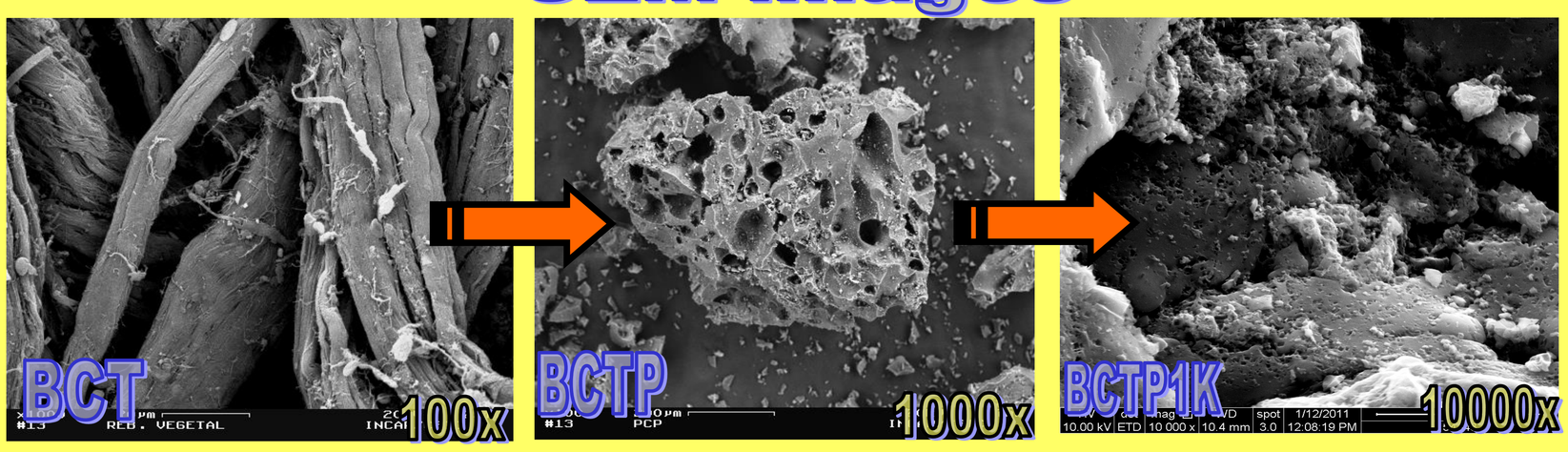
Biocolagenic wastes from the tanning industry as activated carbon precursors

Experimental device for H_2S adsorption



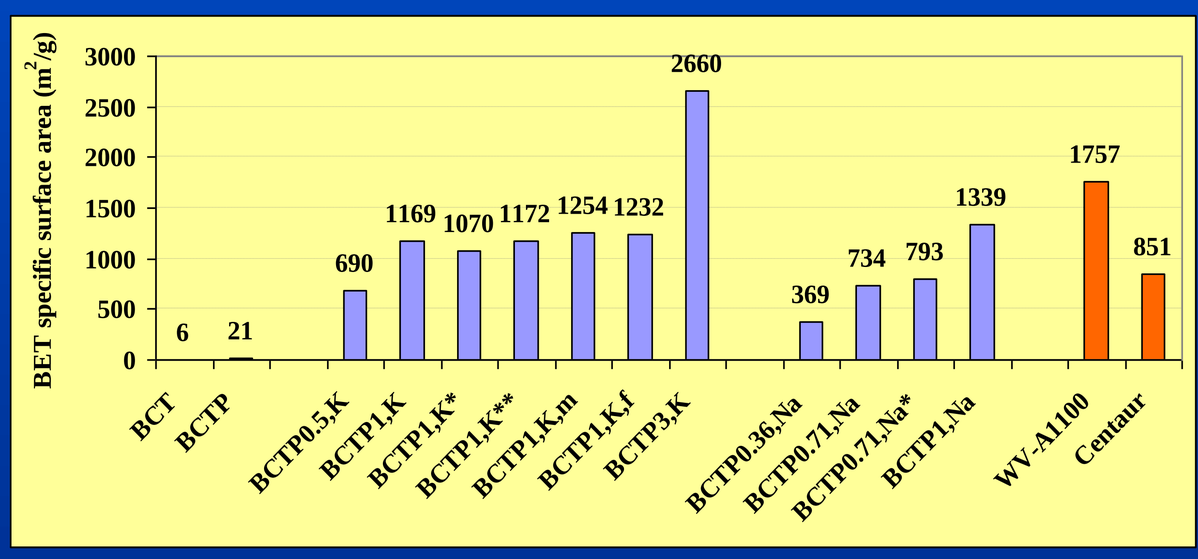
Results & Discussion

SEM images

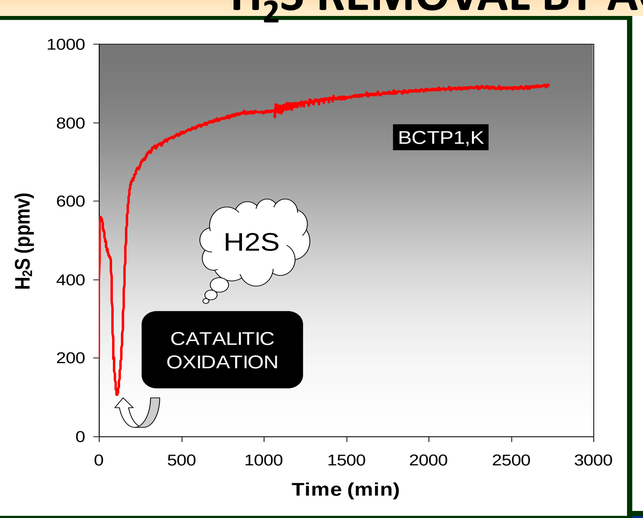


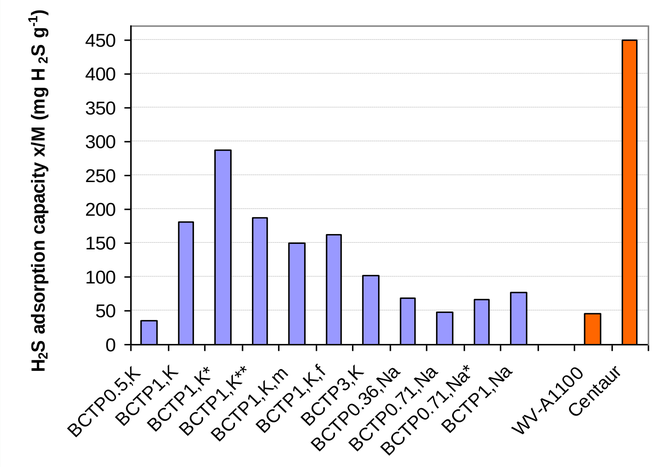
CHEMICAL CHARACTERIZATION

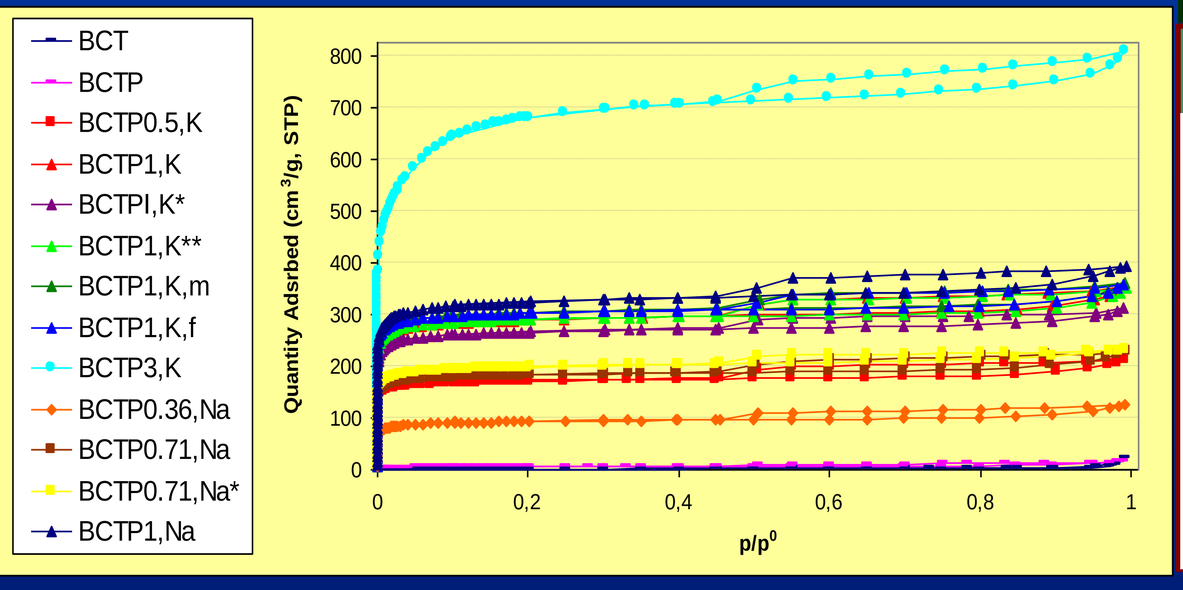
Sample	Ash % b.s	C % b.s.	H % b.s	N % b.s	S % b.s	O % b.s
BCT	2.59	48.21	5.75	7.51	1.91	34.03
BCTP	12.96	78.12	0.86	6.21	0.94	0.91
KOH activated carbons						
BCTP0.5,K	3.49	87.22	0.50	3.96	1.02	3.81
BCTP1,K	0.78	90.61	0.38	2.60	0.80	4.83
BCTP1,K*	10.50	81.13	0.47	1.83	0.00	6.07
BCTP1,K**	1.68	89.29	0.72	1.78	0.34	6.19
BCTP1,K,m	0.54	91.55	0.43	2.22	0.82	4.44
BCTP1,K,f	0.79	91.37	0.31	2.32	0.66	4.55
BCTP3,K	0.42	95.73	0.28	1.16	0.20	2.21
NaOH activated carbons						
BCTP0.36,Na	9.23	83.68	0.10	3.63	0.82	2.54
BCTP0.71,Na	4.77	84.89	0.06	2.51	0.78	6.99
BCTP0.71,Na*	9.6	79.38	0.37	2.15	0.05	8.45
BCTP1,Na	0.75	94.58	0.33	1.43	0.48	2.43



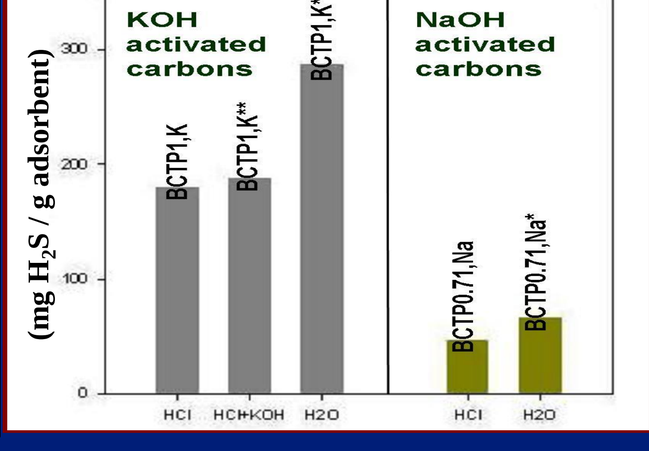
H_2S REMOVAL BY ACTIVATED CARBONS



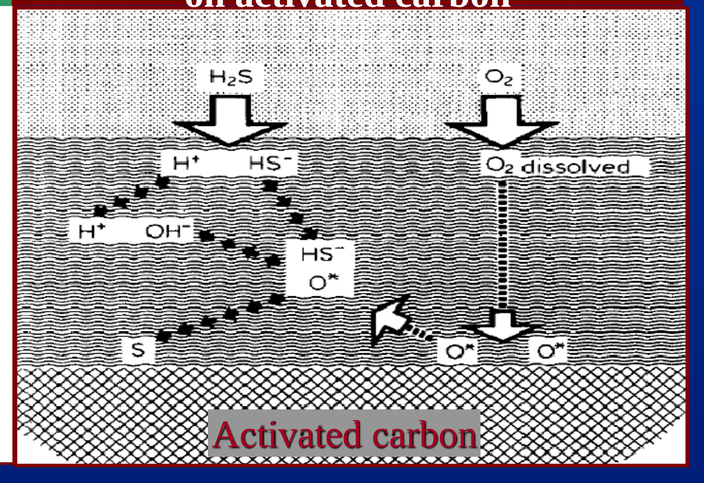




H_2S adsorption capacity on activated carbon



H_2S adsorption / catalytic oxidation on activated carbon



Conclusions

- Industrial biocollagenic waste-based activated carbos were obtained by alkaline chemical activation and used in the H_2S removal.
- The adsorbent materials present low ash content and high carbon content and BET specific surface area up to 2660 m^2/g.
- Chemical activation processes allowed the development of CAs with adequate chemical and textural characteristics for H_2S removal.
- Elimination capacities close to 300 mg H_2S/g adsorbent were obtained.
- Hot water used in the post-activation washing stage modified the chemical properties of the CAs improving the H_2S removal performance.

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