

PREPARATION AND SURFACE AREA CHARACTERIZATION OF ACTIVATED CARBON FROM SEWAGE SLUDGE

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The valorization of the sewage sludge is important from the environmental considerations [1]. The sewage sludge can be utilized by different ways such as agricultural use, land filling and incineration [1]. Production of activated carbon from sewage sludge is an alternative use [2]. In this study, chemical activation method was used to prepare activated carbon from a sewage sludge sample by using KOH as activating agent.

The raw material was ground and sieved to obtain a particle size of 1-1.85 mm. The proximate analysis of the sample used in experiments is as: Moisture 4.24 %, ash 25.22 %, volatile matter 68.42 % and fixed carbon 2.12 %. Theoretical impregnation ratio (IR) (KOH/raw material (w/w)) was selected as 1/2 and 1/1. The sample impregnated with KOH was carbonized in a fixed bed reactor heated by electrically. The final heat treatment temperatures and holding at these temperatures were selected as 500, 650, 750, 850°C and 30 min, respectively. The resulting activated carbon samples were washed with 5 N HCl and then hot distilled water and finally dried at 105°C. Nitrogen adsorptions were made by Quantachrome Autosorb 1-C at 77 K. Pore size distributions were determined with DFT-MC. Total pore volumes were calculated at 0.99 relative pressure and micropore volumes were determined according to the t-method.

The yields, surface areas and pore volumes of the activated carbons obtained at different impregnation ratios and temperatures are given in Table 1. The dominant factor under our experimental conditions on the improvement of surface area and increase of the total pore volume is activation temperature rather than the impregnation ratio. According to the pore volumes, the activation process under our experimental conditions mainly developed mesopores in the resulted carbons.

Temperature-IR (°C-w/w)	S _{BET} (m ² /g)	V _{tot} (cm ³ /g)	V _{mic} (cm ³ /g)	V _{meso} (cm ³ /g)	Yield (wt%)
Raw	8	0.0196	not determined	0.0196	-
500-1/2	3	0.0083	not determined	0.0083	52,16
650-1/2	167	0.3315	0.0243	0.3072	24,97
750-1/2	261	0.4260	0.0577	0.3683	24,14
850-1/2	415	0.5178	0.0887	0.4292	15,92
500-1/1	13	0.0477	not determined	0.0477	36,81
650-1/1	155	0.2188	0.0235	0.1953	18,47
750-1/1	195	0.2432	0.0350	0.2082	17,48
850-1/1	397	0.4411	0.0853	0.3558	10,69

References

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