SUPPLEMENTARY MATERIAL TO

**Study of Raw and Modified Carbon Molecular Sieves Using Waste Engine Oil for Carbon Dioxide and Methane Adsorption**

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The results of BET analysis indicate that the acid-treated CMS (A-3) with a granulation size of 600-1180 microns has more surface area, volume and pore size as compared to non-granulated, non-acid-treated, unmodified CMS (R). The highest amounts of carbon dioxide and methane adsorption were obtained for CMS (A-3) sample (0.925 CO2/g adsorbent and 0.353 mmol CH4/g adsorbent for carbon dioxide and methane, respectively).

Table VI. The results of the effects of modifying the adsorbent on the capacity of carbon dioxide and methane adsorption

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| CO2 | | | CH4 | | |
| CMS (A-2-T)˂ CMS (A-2-K)˂ CMS(A-2) | | | CMS (A-2-T)˂ CMS (A-2-K)˂ CMS(A-2) | | |
| CMS (A-2-T) | CMS (A-2-K) | CMS(A-2) | CMS (A-2-T) | CMS (A-2-K) | CMS(A-2) |
| 0.381 | 0.477 | 0.639 | 0.114 | 0.191 | 0.343 |
| CMS (A-3-K)˂ CMS (A-3-T)˂ CMS(A-3) | | | CMS (A-3-K)˂ CMS (A-3-T)˂ CMS(A-3) | | |
| CMS (A-3-K) | CMS (A-3-T) | CMS(A-3) | CMS (A-3-K) | CMS (A-3-T) | CMS(A-3) |
| 0.610 | 0,629 | 0.925 | 0.248 | 0.343 | 0.353 |
| CMS (R-2-K)˂ CMS (R-2-T)˂ CMS(R-2) | | | CMS (R-2-K)˂ CMS (R-2-T)˂ CMS(R-2) | | |
| CMS (R-2-K) | CMS (R-2-T) | CMS(R-2) | CMS (R-2-K) | CMS (R-2-T) | CMS(R-2) |
| 0.532 | 0.534 | 0.620 | 0.114 | 0.165 | 0.340 |
| CMS (R-3-K)˂ CMS (R-3-T)˂ CMS(R-3) | | | CMS (R-3-K)˂ CMS (R-3-T)˂ CMS(R-3) | | |
| CMS (R-3-K) | CMS (R-3-T) | CMS(R-3) | CMS (R-3-K) | CMS (R-3-T) | CMS(R-3) |
| 0.410 | 0.524 | 0.600 | 0.095 | 0.162 | 0.276 |

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