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ADSORPTION OF ACITIC ACID ON ACTIVATED CARBON PREPARED FROM COKE

Abstract: *Activated carbon was prepared by treatming of coke using miniral salts (potasium and sodium chloride) in varius ratio.*

The optained activated carbon used to adsorption of acitic acid from aqua solution.

The maximum adsorption capacity reached (0.546 g / g) usin KCl with KCl/coke =6.

Keywords: *activated carbon, coke, Acitic acid adsorption.*

АДСОРБЦИЯ УКСУСНОЙ КИСЛОТЫ НА АКТИВИРОВАННОМ УГЛЕ ПОЛУЧЕННОМ ИЗ КОКСА

***Аннотация**: Активированный уголь готовили обработкой кокса с использованием минеральных солей (калия и хлорида натрия) в различных соотношениях.*

Полученный активированный уголь используют для адсорбции ацитовой кислоты из водного раствора.

Максимальная адсорбционная емкость достигала (0,546 г / г) при использовании KCl с KCl / кокс = 6.

***Ключевые слова:** активированный уголь, кокс, адсорбция уксусной кислоты.*

1. Introduction

Petroleum coke is a by-product, mainly composed by carbon, produced during heavy oil refining and upgrading processes. Nowadays, petroleum coke is mainly used for power generation, electrodes manufacture for alumina industry and reductant of iron manufacturing process. Petroleum coke production is expected to increase as a result of the worldwide extended upgrading of heavy crude oil. In order to avoid Petroleum coke accumulation, various alternative utilizations need to be established. Among them, activated carbon (AC) preparation is one of the most widespread options. Economical and technical aspects support the fact that Petroleum coke is a competitive and optimum raw material for activated carbon production [1]. As well known, activated carbon is a nanoporous material, and it is widely used in various fields, such as gas separation, purification, and catalyst processes, due to its developed pore structure and surface chemistry. Activated carbons can be prepared from a variety of carbonaceous precursors by different activation methods [2]. Petcoke is a promising raw material for preparing high surface area AC, due to its high carbon content, low volatile matter and ash contents. KOH chemical activation has been reported as a prominent activation method for preparing highly porous activated carbon from different raw materials, including petcoke [3]. Jiang et al. [4] studied the influence of chemical pre-treatment of petroleum coke as a precursor on the production of activated

carbon. Results showed that induced modification of petroleum coke, by using H_2O_2 and $HClO_4$, promoted the formation of activated carbon with high specific surface area. Wu et al. [5] revealed that chemical activation with KOH + H_2O is an efficient method for the preparation of porous carbons with high surface areas, among KOH chemical activation, H_2O physical activation, and KOH + H_2O co-activation methods. Chunlan et al. [6] investigated the influence of pre-carbonization of Petroleum coke precursor on activated carbon properties prepared using KOH. They found that the decrease in BET surface area of the produced activated carbon is attributed to a reduction of oxygenated functional species on the precursor surface, as the pre-carbonization temperature was increased.

The main objective of the present study is to investigate the adsorption behaviors of Acitic acid on activated carbon prepared using petroleum coke as raw material.

2. Experimental:

2.1. Preparation of activated carbon:

The petroleum coke was supplied by Petrochemical Factory (Homs, Syria), and its particle size ranged from 0.2 to 0.45 mm. Activated carbon was prepared, with NaCl/coke mass ratio (4, 6 and 10) and KCl/coke mass ratio (4, 6 and 10). The samples were heated at (400 °C) for (4h). After that the samples were washed with deionized water and 100mL of Aqua regia added and mixed about 24 h.

the samples were filtered, washed with deionized water and heated at (400 °C) for (4h).

2.2. Adsorption of acitic acid:

About (1g) of prepared activated carbon heated at (120 °C) for (1h), then adedd to 100 mL of acitic acid (0.07 M) and stirred for (30 min).

The solution was separeted and titrated with NaOH (0.07 M) to quantification of adsorbed acitic acid ammont.

3. Results and Discussion:

3.1. Characterization of prepared activated carbons:

Figures (1, 2) show the IR spectrum of the coke and prepared activated carbon respectively. Figure (2) shows a wide band at (1203 cm-1) belongs to the (C-O-C) groups, which clearly indicate the reaction between oxygen and carbon, and the activation occurs.

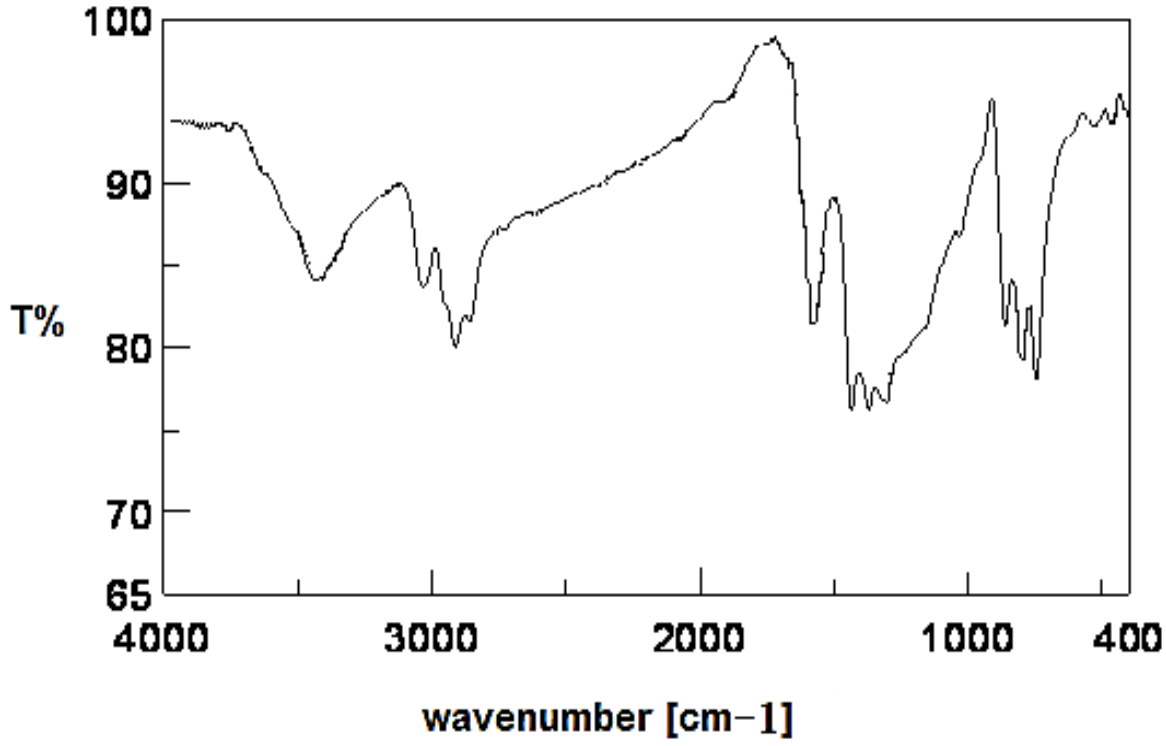

Figure (1): IR spectrum of petroleum coke

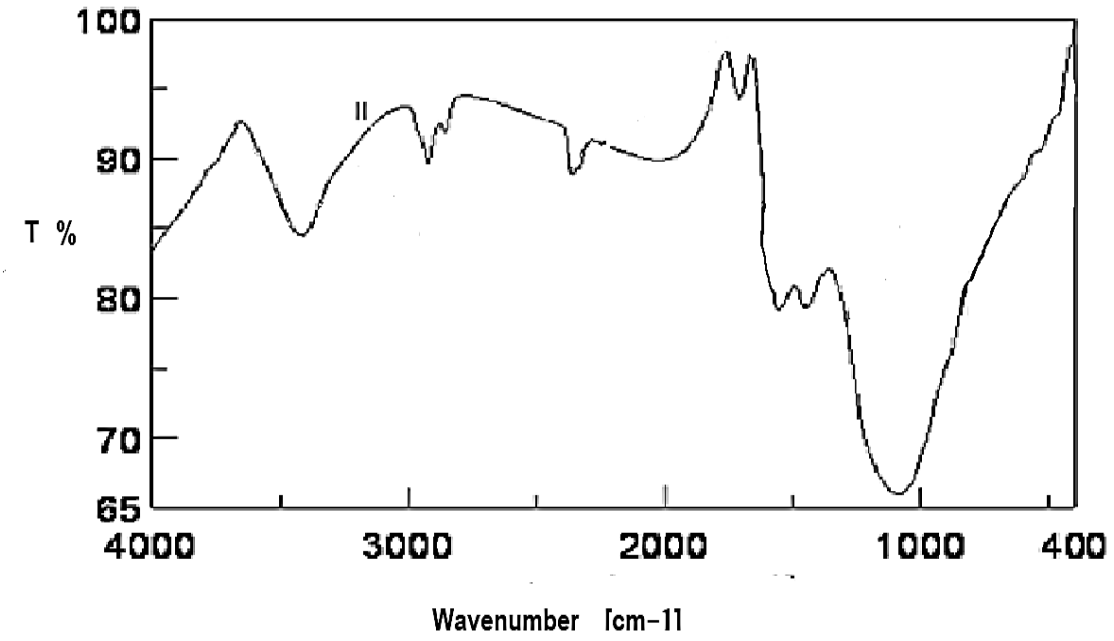

Figure (2): IR spectrum of prepared activated carbon

3.2. Effect of salt/coke mass ratio on the adsorption of acitic acid:

By increasing of salt/coke mass ratio the adsorption capacity increased to the maximum value then decreased as shown in the figure (3).

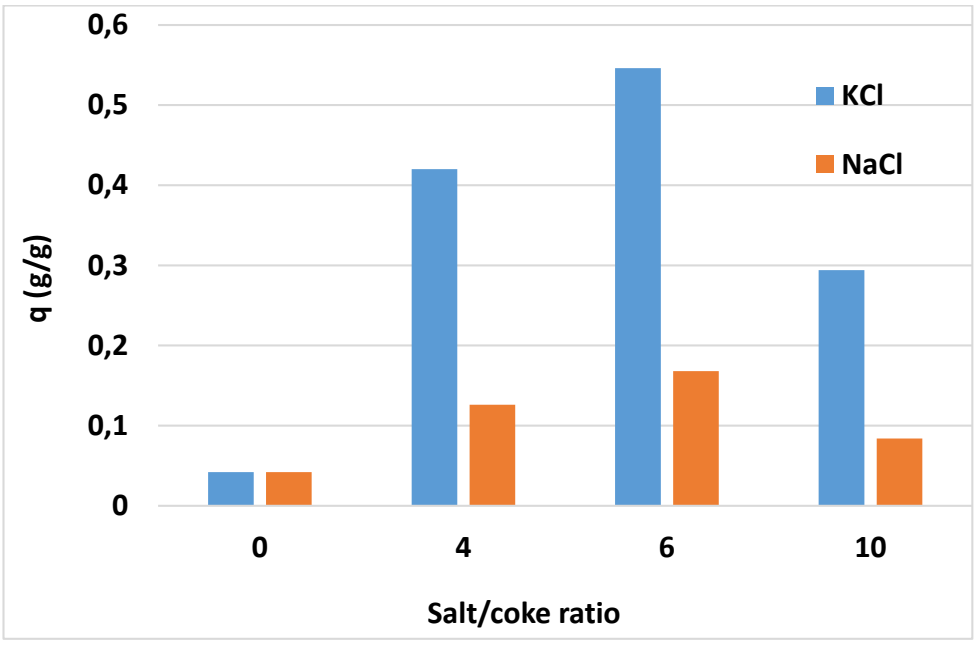

Figure (3): adsorption capacity by salt/coke mass ratio

KCl is better in the activation due to its capability to remove sulfur from coke.

4. Conclusion:

We note that potassium chloride is better than sodium chloride in the activation process. Especially for (KCl / C = 6).

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