

Screening of activated carbon using the SpinChem® RBR S2

In co-operation with ZHAW, students screened various types and sizes of activated carbon using the SpinChem® RBR S2. Five different carbons were screened by decolorizing solutions of methylene blue in distilled water. The decolorization process was monitored using inline UV-Vis spectrometry (PAT). The results show the importance of choosing the correct media for your application. In this case of activated carbon, the source and type of the activation is of major importance, which can be seen by comparing the performance difference of the three 12x40 mesh carbons tested. Also, by comparing Carbon A in different mesh sizes, it can be seen that finer mesh carbon shows faster adsorption.

Keywords: Activated carbon, Decolorization, Technology, Rapid screening, Inline monitoring (PAT)

The SpinChem® rotating bed reactor (RBR) is an alternative to conventional techniques used for heterogeneous reactions, such as STRs and fixed bed reactors. A unique advantage of the RBR is that it allows for inline monitoring since the solid phase is contained within the RBR and not disturbing the measurement. In this application note, an inline UV-Vis spectrophotometer was used to monitor the decolorization process. Five different carbons were screened by decolorizing 16.3 mg of methylene blue in 250 ml of distilled water at 600 rpm. Each carbon differs in either mesh size or type of activation and 5 g of carbon was used in each run. Fig.1 shows the performance between three different types of carbon. Carbon B and Carbon C are both based from bituminous

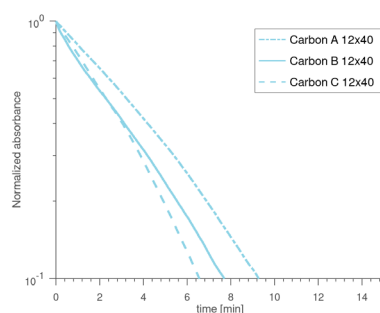


Fig 1. Normalized absorbance over time using three different types of 12x40 mesh carbons. Carbon A is coconut shell based, while Carbon B and Carbon C are based on bituminous coal.

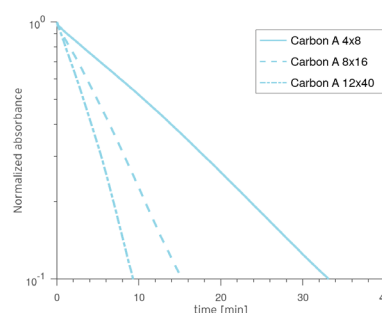


Fig 2. Normalized absorbance over time for three mesh sizes of Carbon A.

coal which show enhanced performance compared to the coconut shell based Carbon A. Fig.2 shows the difference in performance when changing the mesh size of the carbon. The finest mesh, 12x40, shows the fastest absorption rate and is a clear winner in this experiment.

Conclusions:

- The type of activated carbon matters for performance where bituminous coal based carbon performed much better in this experiment.
- A finer meshed carbon is also of major importance for performance as the 12x40 mesh carbon shows much faster adsorption compared to the larger meshes.



The SpinChem® rotating bed reactor (RBR) technology is revolutionizing mass transfer in heterogeneous reactions where solid phases are used for catalysis, enzymatic reactions, adsorption, scavenging and other processes. The convenience of a protected bed within an RBR significantly reduce the need for post-reaction work-up. It also gives the option of using inline measurement instruments since there are no free flowing particles that disturbs the measurement. The SpinChem® RBR concept is fully scalable from laboratory to production, thus providing both more efficient reaction development and improved production economy.

Products: SpinChem® RBR S2 (1221-001)

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