

Filter Aids

“Filter Aids” is a group of inert materials that can be used in filtration pretreatment. There are two objectives related to the addition of filter aids. One is to form a layer of second medium which protects the basic medium of the system. This is commonly referred to as “precoat”. The second objective of filter aids is to improve the flow rate by decreasing cake compressibility and increasing cake permeability. This type of usage is termed as “admix” or “body feed”. Filtration without filter aid, with precoat, and with precoat and body feed is shown in Fig. 1 (Eagle-Pitcher Minerals, Inc., 1970).

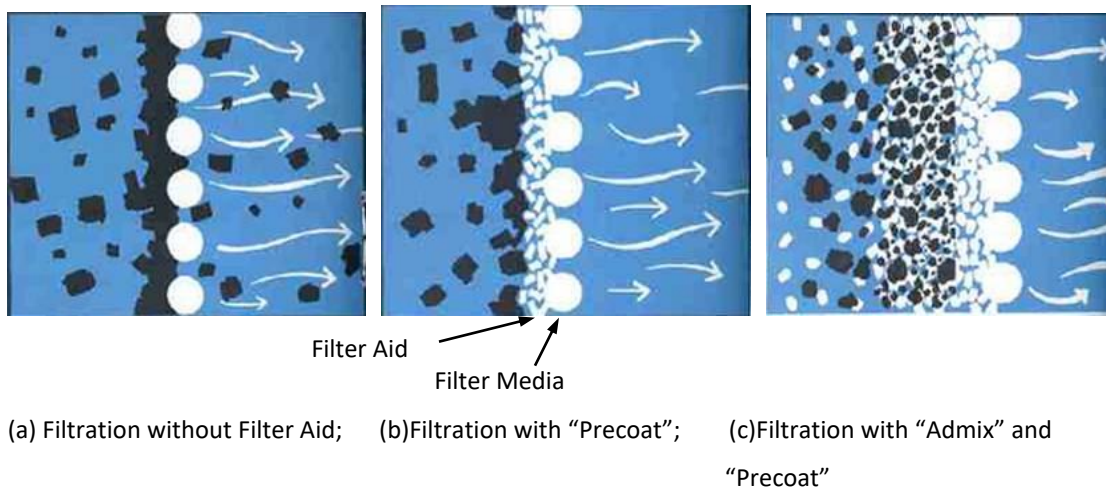


Fig. 1 Mechanism of Filtration with Filter Aids

The common filter aids are diatomaceous earth (DE), perlite, cellulose and others.

Diatomaceous earth (DE) is the skeleton of ancient diatoms (Fig. 2a). They are mined from ancient seabed, processed, and classified to make different grade of filter aids. DE is the most commonly used filter aid today. However, the crystalline type DE is a suspicious carcinogen and inhalation needs to be avoided during handling.

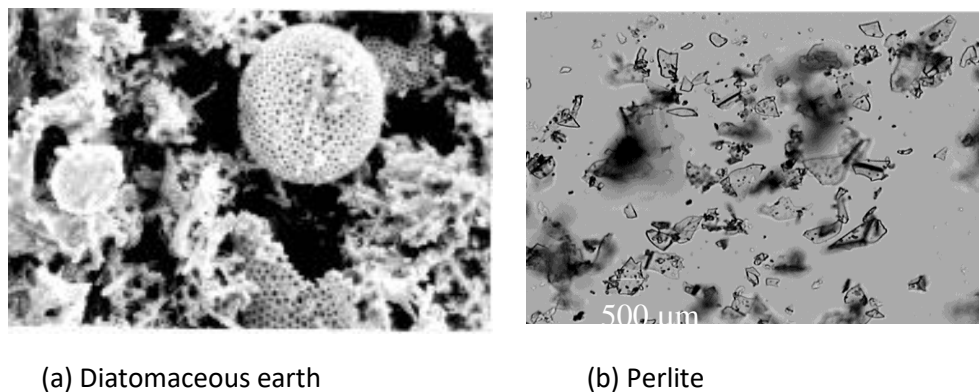


Fig. 2 Typical Filter Aids

There are different grades of commercial DE. A finer grade may be employed to increase the clarity of filtrate. The smaller the filter aid particle size, the smaller the process particles can be removed. However, the filtration rate is lower. There is always a balance between initial filtrate clarity and filtration rate. The particle size capture by various filter aids may also vary because of liquid viscosity, surface charge, etc.

Perlite is another important mineral filter aid. It is a particular variety of naturally occurring glassy volcanic rock, characterized by onion like, splintery breakage planes (Fig 2b). After crushing and heating, this rock will expand in an explosive fashion to about ten times its original volume.

Diatomaceous earth and perlite are silica based minerals. There are several other special materials used as filter aids, including asbestos, cellulose, agricultural fibers, saw dust, rice hull ash, paper fibers etc.

Cellulose can be used for filtration system that cannot tolerate silica. The filterability of cellulose is much worse than DE or perlite but cellulose can be incinerated as well as providing better cake integrity. Calcined rice hull ash and fibers from used newspapers are relatively new filter aids. They are used for wastewater sludge dewatering.

For more information, one can attend the Basic Solid/Liquid Separation course offered by the American Filtration and Separation Society.

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Keywords
Filter aid
Solid liquid separation
Chemical process
Process design
Filtration applications