Comparison between Ceramic Membranes and Organic Membranes

1. Stability and Resistance

Ceramic membranes (CRM) perform better in chemical and physical stability compared with organic membranes (ORM).

a. Temperature. CRM is made under very high temperature. The usual designed temperature is allowed to reach 80 ~ 90 ℃, which considers the temperature tolerance of components, like sealing rings. The operating temperature of ORM is not allowed to exceed 45 ℃ generally. Moreover, the flux of ORM reduces apparently at low temperature.

b. Chemical stability. CRM can be applied in solutions containing acid, base, or organic solvents, while ORM is likely to be corroded or swelled.

c. Mechanical Strength. CRM has high mechanical strength.

2. Filtration Accuracy

CRM is able to be used for micro-filtration (MF), ultra filtration (UF), and even nano filtration (NF). MF and UF are more common. ORM has higher filtration accuracy. Therefore, CRM can be used as pretreatment to protect ORM in subsequent steps. However, for the same section and same function, CRM is a more considerable choice. It usually has higher flux, higher recovery rate and better clarification performance.

3. Installation

A set of CRM system is usually integrated on a rack. It usually occupies small space. It is convenient to be connected with other equipment on the site as well. Some ORM systems require much larger space for installation.

4. System Cleaning

CRM performs better in anti-pollution. Even if fouling occurs after long term use, CRM is allowed to be cleaned with high temperature and kind of high content of acid or alkali. CRM is also allowed backwash if it is necessary. These operations ensure the CRM has longer service life. In some circumstance, its service life can achieve 8 to 10 years.

5. Maintenance

The maintenance of CRM is easy. Clean the system with proper cleaning agent after each use. If the system will not be used in a long time, clean the system and empty it.

Regarding the ORM, it must be soaked in protection liquid if it is not used in a long term. And the protection liquid needs to be replaced regularly. The ORM is kind of easy to be fouled resulting in a shorter lifespan. Therefore, the membranes may need to be replaced in shorter period.

Overall, CRM cannot completely replace ORM. But if both of them can be applied, the CRM has significant advantages compared with ORM. The final choice is based the specific case.