Q&A

Q: Now we are using powder PAC as coagulant in WTP. Recently, a company which provides liquid PAC has established in my country. I consider using liquid PAC. So, I want to know the specification, life time, storage and advantage and disadvantage of liquid PAC. (M.N, Cambodia)

A1: For the question about PAC, I have to say that I don't have direct experience in using liquid PAC since it has been used at Bangkhen WTP only. But during the raw water turbidity crisis in year 2006, I had used powder PAC for a short period for about 3-4 weeks. In my opinion, there are pros and cons in term of usage. But powder PAC and liquid one are not much different in chemicals composition, because they are selected by the similar specification.

The advantage of powder PAC is that it is easy to handle for its storage. Only keep it in dry place and manage by "first in, first out" not to expire. It has normally 2 years shelf life in powder form and 6 months after preparing solution. The disadvantage is that powder PAC requires a machine to prepare PAC solution and a little time to allow that the chemicals chain becomes stretch before usage in order to get good coagulation efficiency. The preparation time may take 3-4 hours before use. If preparation time is not long enough, the coagulation efficiency might be lower and needs more coagulant to be added. It is costly.

For the liquid PAC, it is much easier to use. It only needs stock tank and metering pump. So, usage of Liquid PAC decreases the work load in preparation step. But the important concern is its shelf life and stock tank. The shelf life is less than 1 year (I don't know exactly). The concentration is normally 30-40%, therefore the higher concentration leads to higher chance to precipitate in stock tank. And lower concentration needs more space to place stock tanks. If WTP has limited space and the same size of space for storage of powder PAC, the total PAC stock will decrease to one third. It means that it increases a risk in chemicals stock management. The big concern is that the supplier should have enough capacity to supply liquid PAC firmly and continuously.

(Answerer: Ms. Chaweepan Suangkiattikun, Metropolitan Waterworks Authority, Thailand, 2015)

A2: Regarding the question about liquid PAC, when powder PAC is used in liquid form, coagulation effectiveness is same as liquid PAC. Advantages of PAC comparing alum is explained in the back number of the newsletter; http://waquac.net/english/pdf/newsletter200906_en.pdf If liquid PAC is purchased and kept in the plant, there are some technical points about storage as follows.

・Store in a cool dry place away from direct sunlight. Liquid PAC tends to decompose to a white turbid solution when it is stored at temperature higher than 40℃.

・ Liquid PAC becomes unstable and loses effectiveness when it is kept long as a diluted solution of less than approximately 3% (as Al2O3)

・ Store and transport in corrosion resistant containers such as rubber lined steel, PVC, FRP, polyethylene, etc.

・Precipitate is produced when it is stored for a long time, it will cause blockage of dosing pump and piping. So, clean the storage tank and injection pipe regularly.

・ Furthermore, regarding shipping of liquid PAC; it is very sensitive to transportation over long distance.

Many water suppliers in Japan follow the Japanese Industrial Standard (JIS) for liquid PAC for the specification. http://www.waquac.net/pdf/data/standard_criteria_01.pdf

In using liquid PAC, we have experience that pipeline was clogged between storage tank and service tank. It was raised by crystallization of liquid PAC because the flow velocity was very low due to large diameter piping. After the trouble, double pipe system was installed, and piping is cleaned regularly.

(Answerer: Mr. HAYASHI Shingo, Osaka Water Supply Authority, 2015)

A3: When you change a coagulant from powder PAC to liquid PAC the renovation of dosing facility is required. The concentration of liquid PAC is 10% as Al2O3 in Japan. The liquid PAC you can get in your country is maybe 10% same as in Japan. I think currently you may make 10% of PAC solution by dissolving 30% of powder PAC to water. If you do so, the dosing volume should be same as current volume. Therefore,

the solution tank and the dosing facility are possible to use without renovation. However, a new storage tank and the transfer pump system from a storage tank to a service tank (current solution tank) are necessary.　A storage tank should be put a place where a tank truck can send liquid PAC. If you change a coagulant from powder to liquid, the dissolving work become needless, but the cleaning work of tank and dosing pipe is still necessary. The coagulation efficiency does not change, because the specifications of liquid PAC and powder PAC are almost same.

(Answerer: Mr. KAGATA Katsutoshi, Kitakyushu City Waterworks Bureau O.B., 2015)