

## INFO SHEET

### TIPS AND TRENDS

#### CLOUDY POOL WATER

*Bill Mansfield*

Cloudy water is the most recurring problem faced by pool owners; this is caused by tiny particles that are suspended in the water.

The main reason for cloudy pools include:

- Water balance: If the pool water isn't correctly balanced you may face cloudiness.
- Poor filtration: There are many reasons for poor filtration, starting with inadequate filter size, problems with hydraulics, inadequate pump size, short filtration cycles, old filter media, etc.
- Poor surrounds often contribute particles such as leaves, bugs and other organic material, which break up in the pool water.
- High bather load: Bathers obviously bring things like dirt, dust, lint, suntan lotion, skin cells, etc into the pool.
- Algal bloom.
- Heavy rain.

#### A technical review

Cloudy suspensions occur when individual particles in the water won't come together and instead repel each other. These repulsion forces come from water being absorbed onto the surface of many particles and forming a protective layer, which repels the other particles. All particles have an electrical charge on their surfaces, the sign (positive or negative) and strength of which are dependent on the type of particle involved.

The repulsion forces are so strong that the individual particles won't come together without some assistance – hence the need to use a process called flocculation to get rid of them. Flocculation is a process wherein particles come out of suspension in the form of flocs or flakes, due to the addition of a flocculant or clarifying agent – ie, pool chemical.

#### About flocculants and clarifiers

A flocculant is a chemical that can be added to the water to help particles and any other suspended solids bind together and form heavier particles. The heavier particles then settle to the bottom of the container/tank and the water on the top is drained off (in the case of a swimming pool they are either vacuumed or filtered).

The most common flocculant used in the pools are: alum (aluminium sulphate) and cationic polymers.

#### Aluminium compounds

When aluminium sulphate is added to water, it dissociates and forms ions (charged atoms). Particles with surface charges bind together with these ions and become heavy enough to settle to the bottom of the water. For example, if aluminium sulphate is added to water containing particles with negative charges, the particles' negative charges are attracted to the aluminium's positive charges (opposites attract). This causes the particles to aggregate, increasing in mass, such that the motion in the water is no longer enough to retain the particles in suspension.

## **Polymers**

Polymers are useful as flocculants because they are robust molecules and sometimes carry charges. Because they are so large, small particles can get trapped in the curves of the polymer, causing them to accumulate a mass heavy enough to prevent their retention in solution. These larger particles can therefore be removed from the water by filtration or by vacuuming. The most common polymers used in the pool industry are polyaluminum chloride, or PAC, and cationic polymers (poly DACMAC and polyacrylamides). The cationic polyelectrolytes are used to clarify the pool rather than floc it.

### **When use them**

If the purpose is to clarify slightly cloudy or hazy water, it is better to use a clarifier as it is faster and less of a hassle to use.

If the water is really dirty – ie, if you can only see down into the water a couple of centimetres or two – then a one-time dose of aluminium may be better than multiple doses of a water clarifier.

### **Difficulties with flocculation**

More is not better; always follow doses recommended by manufacturer.

### **How do you determine what is the 'right' dose of clarifier or flocculant?**

The fact is that this is an extremely difficult task which is constantly encountered, not just in the pool and spa industry, but in a range of industrial processes – from drinking water purification to paper pulp manufacture.

Generally, optimum doses increase with increasing molecular weight of the chosen polymer flocculant, but the trade-off is that the rate of settling is very much slower. Fortunately, there is a procedure which greatly reduces the chance of overdosing while ensuring a reasonable rate of settlement.

ALWAYS follow the dosage rates recommended on the product labels. These rates have been determined after extensive testing on a wide variety of pools with varying degrees of cloudiness from a range of sources.

Wait 24 – 48 hours with the pump OFF, then vacuum up any sediment from the bottom of the pool. Take care when vacuuming so you don't stir up the sediment too much or you will need to let it settle again.

If the pool is still cloudy, you should nevertheless perform this vacuuming step, as it will reduce the 'load' on any flocculant that either remains in the water or is subsequently added to the system.

If cloudiness persists, repeat the dose as specified on the bottle. Also, as mentioned earlier, flocculants (and clarifiers, for that matter) are pH dependent to one extent or another.

While this dependence is most pronounced for alum, it is recommended that you ensure the pH falls within the label-specified range in order to optimise the rate of particle aggregation and, water clarification.

Importantly, no matter what the choice of flocculant, NEVER agitate the sediment more than necessary when vacuuming the bottom of the pool or you run the risk of breaking the aggregates apart. While the effect is again most pronounced when using alum, it has been found that aggregates formed in the presence of excess polymer flocculant degrade faster than those that form at the optimum concentration.

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