

Jar Testing Procedure

The jar testing procedure described herein is provided by Turbid Water Solutions to assist our clients undertake their own jar tests to inform selection of appropriate treatment product(s) for their site, the design of HES basins, the set-up and adaptive management of automatic dosing systems and the continuous review and update of treatment product dosing rates as site conditions vary through the development cycle.

Water chemistry and soil minerality are variable in space and time requiring frequent jar testing to ensure accurate selection and application of treatment products for effective water treatment.

If additional assistance or advice is required, please do not hesitate to contact a Turbid representative.

Method

STEP ONE: Collect samples of raw water:

1. Raw water samples should be representative of the sediment laden water to be treated by the flocculating agent.
2. It is recommended a minimum of three litres of raw water is collected for use in the jar tests.
3. Grab samples taken shortly after a runoff event and from 30cm below the free water surface near to the inlet of the sediment basin to be treated is preferred.
4. If there is no raw water available on site for collection it will be necessary to create an 'indicative' raw water sample. This is done by collecting representative soil samples from the soil profile expected to be disturbed by construction activities (screened through a 1mm sieve to remove the coarse fraction) and then creating a well-mixed composite sample of the collected soil samples with a clean water source (ideally collected rainwater) at a rate of 10g/L. This will produce an 'indicative' raw water sample with a notional TSS concentration of 10,000mg/L.
5. Measure and record the pH of the raw water sample(s) prior to commencing the jar test. pH lower than 6.5 may require buffering with a sprinkle of hydrated lime. Apply only enough hydrated lime to raise the pH to between 7 and 8.5.

STEP TWO: Prepare diluted samples of the flocculating agent(s) to be tested:

6. It is recommended at least two flocculating agents be tested for each site.
7. Diluted samples are required as the typical dose rate for effective flocculation are in the order of 50 to 300ppm (0.05ml/L to 0.3ml/L).
8. A 1% solution of the flocculating agent (that is 1ml of flocculating agent diluted in 99ml of clean water) can be applied to the 1 Litre sample of raw water in 1ml increments with each increment representing 10ppm (0.01ml/L).

9. Similarly, 10% solution of the flocculating agent (that is 10ml of flocculating agent diluted in 90ml of clean water) can be applied to the 1Litre sample of raw water in 1ml increments with each increment representing 100ppm (0.1ml/L).
10. It is recommended a 1% solution of the flocculating agent be used in most circumstances.

STEP THREE: Add flocculating solution to raw water.

11. Using a syringe, add the 1% solution of flocculating agent in 1ml increments to a 1L sample of raw water, stirring rapidly for around 10-15 seconds after each increment.
12. After each 1ml increment inspect the raw water sample as flow velocities within jar/bottle slow for the formation of 'flocs' (like seen in a snow-globe).
13. Look for a clear portion of at least 5cm depth to form at the surface within a few minutes after stirring has ceased.
14. If a clear portion doesn't fully form within a few minutes add the next increment of 1% solution of flocculating agent, stirring rapidly for 10-15 seconds.
15. Repeat this procedure until the required clear portion is observed.
16. Measure the pH of the final flocced raw water sample to confirm the pH falls within acceptable discharge limits for the site. If measured pH is below discharge criteria it may require addition of lime (or similar) to buffer up the pH.
17. If after adding a large number of increments of a 1% solution of flocculating agent (noting potentially up to 50 increments may be needed) flocs are not forming with the flocculating agent alone the raw water may have low alkalinity. A sprinkle of superfine gypsum may need to be added to raise the alkalinity.
18. If after adding a sprinkle of superfine Gypsum the 1% solution of flocculating agent does NOT form flocs it may be necessary to consider testing an alternative flocculating agent.

STEP 4: Determine required dose rate

19. The total amount of 1% solution of flocculating agent required to achieve the 5cm clear portion will equate to the dose rate required for the sediment basin.
20. For example, if 5ml of a 1% solution of flocculating agent was required, then the dose rate would be 0.05ml per litre of raw water in the sediment basin (i.e. 50L per megalitre of raw water in the sediment basin).

STEP 5: Verify Test Results

21. Repeat Step 3 and Step 4 on a second 1L sample of raw water to verify the initial results.
22. If the results are only marginally different from the initial test then use an average of the two sets of results to set the required dose rate.
23. If the results are markedly different from the initial test then it will be necessary to conduct at least one additional jar test to gain confidence in the required dose rate.

STEP 6: Record Jar Test Data and Results

24. Record the results of each jar test