

From: [REDACTED]
Sent: 13 October 2023 12:06
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: Coagulation/Flocculation chemicals

Hi [REDACTED],

Chemical Dosing Inlet/Outlet

Regarding the coagulant Ferric Chloride, chemical conditioning of suspended particulate matter to improve its settling characteristics only requires very small chemical addition rates. **Accurate dose rates can only be proved by sampling in our own internal lab.**

However, as per Daves email, the typical coagulant dose rate is 5-10mg/L.

When introduced into the water on a flow proportional basis at the optimum pH, virtually all the coagulant (Ferric Chloride) forms an insoluble hydroxide, which is bound up within the settled/floated suspended solids. As a result, virtually all the added chemicals are removed with the settled solids. The concentrations of these chemicals in the solids are, however, very low, and consequently are unlikely to change the waste classification of the settled/floated solids.

In addition to this, there is typically a direct relationship between suspended solids level and concentration of the active metal within water (Iron in the case of Ferric Chloride). If the Iron is in particulate form and we reduce the amount of suspended solids (which the Iron is bound to), we will also reduce the amount of Iron present in the treated water.

As an example, below I have tabulated *external lab results* of a project we have recently undertaken in Cornwall. 'Inlet' refers to the characterisation of the feedwater prior to the addition of any coagulants or flocculants. 'Outlet' refers to the characterisation of the treated water at the point of discharge back to surface watercourse.

Dose rates in to the [REDACTED] system:

- Ferric Chloride 10mg/l
- Anionic Polymer AQ2084 2mg/l

	pH	TSS(mg/l)	Total Iron (mg/l)	Dissolved Iron (mg/l)
Sample 1 Inlet	7.3	772	29.23	0.47
Sample 1 Outlet	7.2	12	0.99	0.05
Sample 2 Inlet	7.4	882	34.05	0.19
Sample 2 Outlet	7.0	15	0.77	0.18
Sample 3 Inlet	7.2	687	28.46	0.05
Sample 3 Outlet	6.9	17	0.98	0.05

You can see from these results that the inlet concentrations of dissolved metals are virtually the same as the outlet concentrations. The decrease in total Iron from inlet to outlet can be attributed to the removal of suspended solids that were contributing to these readings – even after adding 10mg/l of Ferric Chloride.

250mg/l Target

In short, and especially during the winter months, yes you will require coagulation/flocculation to achieve a TSS of <250mg/l. When you have an extended period of rain and solids are given less time to settle in an attenuation pond, the TSS will almost certainly be higher than 250mg/L which will require treatment via coagulation/flocculation to achieve <250mg/l. In summer months when solids will likely have more time to settle out from suspension, feed waters may be <250mg/l – hence the suggestion of solids monitoring on the inlet of the system to inhibit dosing if the feed water TSS is <250mg/l.

When incoming waters have a TSS >250mg/l, we wouldn't achieve <250mg/l under gravity settlement, due to the presence of clay particles which exhibit slow settling characteristics and require the controlled addition of both a coagulant and flocculant to improve the settling characteristics of the particles.

For reference, Hinkley Point C have a TSS criteria of <250mg/L at 3No. locations – all locations have a [REDACTED] chemical dosing (coagulation/flocculation) system.

Kind Regards,

[REDACTED]
Area Sales Manager (Construction) - South

Tel: [REDACTED]
Mobile: [REDACTED]
Email: [REDACTED]

[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Thanks [REDACTED],

Do you know what the typical concentration of chemicals released at the outlet would be?

[REDACTED]

[REDACTED]

Senior Engineer
Environment - Water Management Consultancy
AtkinsRéalis
01865 734011

From: [REDACTED] >
Sent: 12 October 2023 17:10
To: [REDACTED]
[REDACTED]
Cc: [REDACTED]
Subject: RE: Coagulation/Flocculation chemicals

[REDACTED]

Please find attached the MSDS sheets for the chemicals that are likely to be required during the works at Sizewell.

The ferric chloride is the coagulant and the Aquatreat 2084 is the flocculant. These chemicals are typically dosed in very small quantities e.g. the coagulant would have a typical dose rate of 5-10mg/l and the flocculant a typical dose rate of 1-3mg/l.

Both the coagulant and flocculant are dosed on a flow proportional basis via a calibrated mag-flow meter to ensure an accurate dose rate at all flow rates. The chemicals are stored on spill stands inside a dosing unit or dosing container.

Carbon Dioxide gas is used to treat high pH waters which will typically be found where any concreting works are present.

The Sodium Hydroxide/Caustic may only be required if low pH waters are encountered (caustic has not been required at Hinkley). It may be prudent to include it as part of the permit as a precaution.

We monitor the inlet water quality and only add chemicals if the levels are above preset limits thus minimising chemical consumption. Additionally, the outlet water quality is monitored and the discharge stopped or diverted if the levels exceed preset limits to prevent out of specification discharge.

I trust the above makes sense but don't hesitate to get in contact if you need any further information.

Kind Regards,

[REDACTED]
Head of Operations

Tel: [REDACTED]
Mobile: [REDACTED]
Email: [REDACTED]

[REDACTED]



[Redacted]

[Redacted]

Subject: Coagulation/Flocculation chemicals

You don't often get email from [Redacted]@atkinsrealis.com. [Learn why this is important](#)

Hi [Redacted],

Could you tell me again what chemicals you would be using coagulation and flocculation as part of your system? I'm trying to understand the environmental risks associated with the discharge so am concerned about the release of chemicals from dosing.

Many thanks,

[Redacted] (he/him) MSc M.CIWEM C.WEM

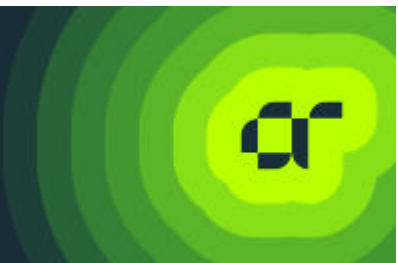
Senior Engineer
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