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Drinking Water Engineering and Science Discussions

Interactive comment on "Optimized conditions for application of organic flocculant aids in water purification" *by* P. Polasek

Anonymous Referee #1

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1. The paper is not reader friendly. I have read it several times, the final time I read it carefully to be sure I understood what the author is saying and it took far too long.

2. I do not feel the paper has anything new to offer. It would seem to draw to readers attention information the author has previously published. If the paper includes previously unpublished work then this is not clear.

3. Several statements are made which should be justified by reference to appropriate published papers e.g. P214, approximately lines 5, 15 and 23.

4. P206.15: The categorization of organic flocculants (Table 1) does not entirely follow common international acceptance. For example, some cationic polymers can act only as a flocculant, whilst certain types can co-precipitate colour and therefore in part at

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least act like a metal-ion coagulant. Thus, whilst a 'flocculant' can only act as a supplement to use of a metal-ion coagulant in order to enhance floc formation, the 'cationic polymer coagulants' can be used to partially reduce the amount of metal-ion coagulant needed to achieve the desired quality (e.g. with respect to colour) of treated water. It is understood that the paper is concerned only with the application of polyelectrolytes used as a flocculant. It is noted that Table 1 does not help the reader distinguish between what the author in his text is distinguishing between 'cationic polyelectrolytes (CPE)' and 'organic flocculant aid (OFA)'

5. P206.25: The author states 'It is common knowledge that application of OFA often results in poorer quality of purified water ... and inefficient filter backwashing.' Yes but: it is the experience of many that poorly applied polymer and especially its excessive dose leads to filter problems. Commonly, the excessive polymer results in accumulation of sludge in the filters that cannot be removed by normal backwashing. This leads to mud-binding (mud-balls and filter bed cracking) and loss of filter efficiency. Usually, this has to be dealt with by replacing the filter media and resolving the dosing of polymer with respect to polymer choice, dosage and its control, and actual application. It is also advisable to have combined air-water wash. This is ultimately implied at the end of the paper P220, Conclusion 6.

6. In addition to use of abbreviations (e.g. OF, CPE and OFA) which the reader has to become familiar with, the author dangerously uses jargon, some of which is of his own making, e.g.: a. P206.5: 'destabilization (aggregation – CPE)' b. P206.7: Post-orthokinetic agglomeration (POA) c. P207.24: Inline high density suspension (IHDS) d. P209.5: Measure of flocculation e. Fig.2: High rate clarification (HRC) technology f. The use of abbreviations has resulted in problems with using the definite (the) and indefinite (a/an) articles. g. P212.18: The statement concerning 'G* stands for G(bar)' should have been dealt with so that it does not have to be made.

7. There is no mention of coagulation pH. In this day and age, no investigation of coagulation can be taken seriously without including measurement and preferably control

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and optimization of pH.

8. Table 3: Water temperature should be quoted when referring to specific clarifier (and filtration) rates.

9. Miscellaneous queries include: a. The word 'purified' is frequently used but seems to have various meanings in that it may refer to quality after just sedimentation or after filtration. b. P206.5: First use of 'CPE' without being defined. c. When an aluminium or iron coagulant coagulant is referred to, i.e. 'destabilisation reagent', it would be better to say 'metal ion coagulant'. d. P207.22: '... agglomeration capacity is fully developed ...' this kind of statement is made several times ∼ would it not be more appropriate to refer to flocculation being optimised or maximised? e. The word 'floc' seems to have been used only once! It would be easier to the reader to use instead of saying the likes of 'formed aggregates'. f. P208.6: what is relevance of 'to the utmost benefit'? g. P210: GHIA and P211: GLIA are not defined h. P211.3: 'RPM' is redundant i. P211.23: Is the statement '-affix F means ...' relevant? j. P212.13: The jar operated without OFA is not a 'blind' but a 'reference' k. P219: What do reference to CCF and Éÿ achieve? l. Table 2: The normal international convention for referring to litres is to use capital 'L' m. Table 2: The title says 'average quality' yet ranges are quoted for turbidity and colour. n. Table 3:P What do MA, MI, PR and NA refer to? o. Fig.1: What does a value of gamma=0 actually mean? Also, isn't gamma simplya way of expressing the value of GT as a normalised value.

10. Conclusions: conclusions should relate directly to the information presented in the paper. New information or statements should not be made e.g.: a. Conclusion 1 does not arise from the evidence presented in the paper. b. Conclusion 6 ∼ 'use of coarser filter media and combined air + water for backwashing' is a new statement.

11. The basic message of the paper seems to be that: a. metal-ion coagulant dose and its application (and coagulation pH) must be optimized; effective application requires rapid dispersion b. polymer dose and its application must be optimized, and again ef-

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fective application requires rapid dispersion followed by conditions to allow floc growth There is nothing novel in this message which was first being made about 40 years ago, (e.g. Miller, Robinson & West, 1965; Yadav & West, 1975) although the significance of what might be called 'delay time' between dosing of coagulant and subsequent dosing of a polymer and also between dosing of a polymer and entry into a clarifier is taking time to be better understood (Bache & Gregory, 2007). Also well known is the importance of adequate (high enough) velocity gradient (G) when coagulant is dosed and that if it is not then coagulant dose may need to be greater to compensate for its poor dispersal (Kawamura, 2000; Bratby, 2008). Miller DG, Robinson M & West JT (1965) Water Treatment Process – 1, Rep No. WRA TR43, WRc, Swindon, UK. Yadav NP & West JT (1975) The Effect of Delay Time on Floc Blanket Efficiency, Rep No. TR9, WRc, Swindon, UK Bache DH & Gregory R (2007) Flocs in water Treatment, IWA Publishing. Kawamura S (2000) Integrated Design and Operation of Water Treatment Facilities, John Wiley & Sons. Bratby J (2008) Coagulation and Flocculation, IWA Publishing

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