Final Assessment Questions: AWWA EL285 Corrosion Control Theory and Treatment

1. You are given the following water quality information for a sample: pH =7.6 units, Eh = 0.2 Volts.

Is this water carrying a disinfectant residual?

Yes/No

Answer: No, the Eh is too low for a residual disinfectant to be present.

2. Why can alkalinity be used as a surrogate for DIC?

a. They are different names for the same parameter.

b. At typical drinking water pHs, both parameters largely consist of the contributions made by carbonate and bicarbonate.

c. DIC is easier to measure than TOC.

d. DIC play no role in corrosion control but alkalinity does.

Answer: b.

3. Profile sampling is being performed on a tap. The Pb concentrations in the samples in order of collection are as follows:

Sample 1 = 5 ug/L, Sample 2 = BDL, Sample 3 = 6 ug/L, Sample 4 = BDL, Sample 5 = 50 ug/L, Sample 6 = 6 ug/L.

Proper procedures were used to collect and analyze the sample. What is most likely about Sample 5?

a. The sample must be invalid, since its concentration is so different than the others.

b. Dissolved Pb has concentrated in this sample.

c. This sample contains particulate Pb.

d. Sample 5 is of no concern, since when averaged with the other samples the concentration is below the Pb action level.

Answer: c.

4. According to the galvanic series, a lead pipe will corrode when brought into direct contact with:

a. Copper pipe.

b. Brass fixture.

c. Both a and b.

d. Neither a nor b.

Answer: c.

5. A metal in the passivity region of a Pourbaix Diagram will not corrode.

True/False

Answer: False. Metal will corrode until a passivation is formed.

6. What is the most important water quality condition in promoting the formation of an insoluble Pb(IV) oxide?

a. Lower the pH.

b. Maintaining a high chloramine residual.

c. Maintaining a high free chlorine residual.

d. Allowing water to stagnate.

Answer: c.

7. What is true about orthophosphate when used as a Pb corrosion control chemical?

a. It promotes the formation of insoluble lead phosphate scales.

b. It is equally effective at all drinking water pHs.

c. It is most effective above pH 8.

d. It is an effective corrosion control strategy since waters naturally contain enough orthophosphate to eliminate the need to add this chemical.

Answer: a.

7. If a utility has decided to increase its pH as its corrosion control strategy, it is controlling Pb release by…

a. Promoting the formation of insoluble lead carbonate scales.

b. Forming calcium carbonate scales.

c. Reducing THMs.

d. Changing its buffer intensity.

Answer: a.

8. Natural organic matter (NOM) can strengthen Pb corrosion scales.

True/False

Answer: False. Pb scales tend to be weaker when higher levels of NOM are present.

9. Pitting corrosion in Cu pipes…

a. Can be a source of high copper levels at the tap.

b. Is seldom a problem.

c. Is caused by DIC.

d. Can occur in soft water.

Answer: d.

10. Greater Cu concentrations at the tap are associated with:

a. Higher pH.

b. Higher DIC.

c. Greater pipe age.

d. All of the above.

Answer: b.

11. Utilities seldom simultaneously exceed the Pb and Cu action level. This is because:

a. Factors influencing metal release from Pb and Cu pipes are not the same.

b. Lead pipes practically never fail.

c. Copper pipes do not corrode easily.

d. All of the above.

Answer: a.

12. Dissolved iron released from iron pipe scales will oxidize and form particulates in water carrying a disinfectant residual.

True/False

Answer: True. Iron is easily oxidized by disinfectant residuals.

13. Why can the disturbance of the shell-like layer in an iron pipe scale be catastrophic for a utility?

a. Large amounts of soluble iron can be released when the layer is disturbed.

b. Turbidity will increase.

c. Disinfectant residual will be difficult to maintain.

d. All of the above.

Answer: d.

14. Can other metals be released when an iron pipe scale is disturbed?

Yes/No

Answer: Yes. Because of iron's high capacity to sorb metals, high concentrations of regulated and unregulated metals can be released when an iron scale is disturbed.

15. What factors are of the greatest concern with galvanized pipe?

a. Diameter and length of pipe.

b. Age and location of pipe relative to sources of Pb.

c. Color and type of zinc coating of pipe.

d. All of the above.

Answer: b.

16. Large variations in pH and alkalinity in treated water is desirable since these variations toughen pipe scales.

True/False

Answer: False. Large variations in pH and/or alkalinity weaken pipe scales.

17. A Langelier saturation index (LSI) or calcium carbonate precipitation potential (CCPP) of >0 is desired since it indicated Pb corrosion is unlikely to occur.

True/False

Answer: False. LSI or CCPP does not predict resistance to Pb corrosion.

18. A utility is switching from alum to PACl, which corrosion index should be evaluated with respect to Pb galvanic corrosion?

a. LSI.

b. Aggressive Index.

c. CSMR.

d. All of the above.

Answer: c.

19. An advantage of blended phosphates are they are more effective for Pb corrosion control than orthophosphate alone.

True/False

Answer: False. Blended phosphates are only effective of Pb corrosion control to the extent they contain orthophosphate.

20. What is not part of a well-conceived Pb and Cu corrosion control program?

a. LSL replacement.

b. Selection of appropriate corrosion control treatment.

c. Meeting appropriate process controls and performance.

d. Use of polyphosphate.

Answer: d.