Residuals, Biosolids and Sludge Processing
Practice Questions

1. As an operator of a gravity thickener, you notice floating sludge rising throughout the thickener. Which of the following would NOT be a cause of the problem?

   a. Sludge decomposing in the tank  
   b. Sludge collection mechanism is off  
   c. Insufficient sludge removal  
   d. Sludge blanket too low

2. To correct an upset (sour) condition in an anaerobic digester, the operator could

   a. stop all mixing of the tank  
   b. withdraw large quantities of sludge and attempt to reseed with fresh primary sludge  
   c. add a source of alkalinity such as lime or soda ash  
   d. decrease the temperature into the cryophilic range

3. The volatile acid to alkalinity ratio of a properly operating anaerobic digester is

   a. 0.1 part volatile acid to one part alkalinity  
   b. 0.4 parts volatile acid to one part alkalinity  
   c. 0.8 parts volatile acid to one part alkalinity  
   d. 1.0 parts volatile acid to one part alkalinity

4. PROBLEM: The belt filter press has large volumes of water carrying over into the dewatering zone and overrunning the sides of the belt. The polymer feed system is NOT the problem. What is the MOST likely cause of the belt washout?

   a. Belt speed too low  
   b. Belt speed too high  
   c. Belt tension too low  
   d. Doctor blades need adjustment

5. The best process control method to prevent upset of an anaerobic digester BEFORE it occurs is:

   a. pH measurement  
   b. F/M ratio  
   c. DO readings  
   d. Volatile acid/alkalinity ratio
6. If the alkalinity test result in the anaerobic digester is 5000 mg/L, what should the volatile acid test result be when the digester is running properly and is well balanced?

a. 5 mg/L  
b. 50 mg/L  
c. 500 mg/L  
d. 5000 mg/L

7. Which of the following would have the least amount of available alkalinity?

a. Calcium oxide  
b. Sodium hydroxide  
c. Propionic acid  
d. Caustic soda

8. PROBLEM: The anaerobic digester has become upset. Symptoms include a high VA/Alk ratio (0.5: 1.0), low methane production and a decreasing pH value. What is the best method for recovery?

a. Shut off all mixing and reduce temp 5 degrees to preserve bacteria  
b. Drain the tank 20% and reseed with sludge from a nearby aerobic digester  
c. Keep the tank well mixed, maintain temperature, add sulfuric acid  
d. Keep the tank well mixed, maintain temperature, add alkalinity

9. The two primary gases formed in the anaerobic digestion process are

a. Nitrogen and oxygen  
b. Methane and carbon dioxide  
c. Methane and oxygen  
d. Methane and water

10. A method of subjecting biological sludge to extreme heat at elevated pressures is called

a. Wet oxidation  
b. Thermal conditioning  
c. Vacuum filtration  
d. Thermophilic anaerobic digestion

11. An anaerobic digester operating in the optimum mesophilic range of temperature control is between which degrees Fahrenheit?

a. 50 to 80 degrees  
b. 85 to 100 degrees  
c. 120 to 135 degrees  
d. All anaerobic digesters are not heated
12. Struvite scale found inside the pipes and equipment of anaerobic digesters is formed from what?

a. Magnesium ammonium phosphate  
b. Calcium, manganese and iron  
c. Iron oxides  
d. Hydrogen sulfide, calcium and methane dioxide

13. The normal cleaning schedule for anaerobic digesters is between

a. 1 to 3 years  
b. 3 to 8 years  
c. 8 and 12 years  
d. 12 and 20 years

14. PROBLEM: The floating cover of the anaerobic digester is tilting, but there is little to no foam around the edges. What is the best method to correct the problem?

a. Add alkalinity in the form of sodium carbonate  
b. Raise the cover to the corbels to re-level  
c. Rapidly pump sludge into the digester to ‘pop’ the cover into place  
d. Adjust or move the ballast weights around cover until it is level

15. What is the purpose of the PVRV (pressure/vacuum relief valve)?

a. To vent digester gas in event of over-pressurization  
b. To vent hydrogen sulfide when it reaches the LEL  
c. To maintain the ratio of methane and oxygen  
d. To prevent a vacuum from forming in the sludge heat exchanger

16. What is a disadvantage of running a digester in the thermophilic temperature range?

a. Nitrifiers will be de-sensitized to the struvite produced  
b. The sensitivity of the organisms to temperature change  
c. The higher costs of heating the digester  
d. The long digestion time
17. When a small plant is considering dosing the anaerobic digester with lime, what is a rough guide on lime dosage?

a. One pound of lime for every gallon of liquid sludge to be treated  
b. One pound of lime for every 1000 gallons of sludge to be treated  
c. Ten pounds of lime for every 100 gallons of sludge to be treated  
d. 100 pounds of lime for every 1000 pounds of sludge to be treated

18. Caution must be used when adding a caustic chemical to a sour digester. Lime can combine with carbon dioxide in the digester to form what problem?

a. Rapid acid build-up  
b. Over-pressurization  
c. Struvite scale formation inside pipes  
d. Formation of a dangerous vacuum

19. Sodium bicarbonate is a good substitute for lime when correcting a sour condition, but it is seldom used due to what reason?

a. High costs  
b. Limited availability in the US  
c. Shipping dangers  
d. Flammability issues

20. Overfeeding of an anaerobic digester during start-up can aggravate which condition?

a. Di-hydrogen oxide formation  
b. Foaming and frothing along the cover edges  
c. Hydrogen sulfide degradation  
d. Carbon monoxide production
Answer Key to:

Residuals and sludge processing sample questions

1. D
2. C
3. A
4. A
5. D
6. C
7. C
8. D
9. B
10. B
11. B
12. A
13. B
14. D
15. A
16. C
17. B
18. D
19. A
20. B