

Operator Quiz Spring 2019 – Basic Conversion Factors, Digester Gas

The following questions are designed for trainees as they prepare to take the ABC wastewater operator test. It is also designed for existing operators to test their knowledge. Each issue of *Clear Waters* will have more questions from a different section of wastewater treatment. Good luck!

1. 1 liter equals _____ milliliters
 - a. 8.34
 - b. 10
 - c. 100
 - d. 1,000
2. 1 kilogram equals _____ milligrams
 - a. 7.45
 - b. 1,000
 - c. 10,000
 - d. 1,000,000
3. 1 foot of water equals _____ psi
 - a. 0.231
 - b. 0.433
 - c. 0.866
 - d. 1.00
4. 1 MGD equals _____ GPM
 - a. 7.48
 - b. 8.34
 - c. 694
 - d. 1,000,000
5. 1 gallon equals _____ liters
 - a. 3.78
 - b. 7.48
 - c. 8.34
 - d. 10
6. 1 horsepower equals _____ kilowatts
 - a. 746
 - b. 3.48
 - c. 7.46
 - d. 7.48
7. 25° Celsius equals _____° Fahrenheit
 - a. 100
 - b. 98
 - c. 77
 - d. 50
8. 1 cubic meter equals _____ liters
 - a. 1
 - b. 10
 - c. 100
 - d. 1000
9. 1 pound equals _____ grams
 - a. 100
 - b. 250
 - c. 454
 - d. 565
10. 1 kilogram equals _____ pounds
 - a. 2.2
 - b. 22
 - c. 220
 - d. 2000
11. A properly operating anaerobic digestion process typically produces how many cubic feet of gas for every pound of volatile matter added?
 - a. 1 to 2
 - b. 2 to 4
 - c. 6 to 8
 - d. 8 to 12
12. Calculate the digester gas production in cubic feet of gas produced per day per pound of volatile solids destroyed using the following information:
Gas produced = 150,000 cu ft/day
VS destroyed = 17,500 lbs/day
Digester Volume = 1.5 million gallons
 - a. 0.12 cu ft gas/day/lb VS destroyed
 - b. 0.17 cu ft gas/day/lb VS destroyed
 - c. 8.57 cu ft gas/day/lb VS destroyed
 - d. 12.9 cu ft gas/day/lb VS destroyed
13. The composition of digester gas consists of 65%-70% methane and 30%-35% of:
 - a. Carbon monoxide
 - b. Nitrogen
 - c. Hydrogen
 - d. Carbon dioxide
14. Digester gas has a heat value of about:
 - a. 100 – 200 BTU/cu ft
 - b. 200 – 400 BTU/cu ft
 - c. 400 – 500 BTU/cu ft
 - d. 500 – 600 BTU/cu ft
15. A mixture of 85%-95% atmospheric air in combination of 5%-15% methane creates which of the following?
 - a. An explosive condition
 - b. Struvite
 - c. Excess pressure
 - d. Increased BTU

Answers and explanations on page 62.

For those who have questions concerning operator certification requirements and scheduling, please contact Tanya May Jennings at 315-422-7811 ext. 4, tmj@nywea.org, or visit www.nywea.org/OpCert.

Operator's Quiz "Spring 2019 – Basic Conversion Factors, Digester Gas" Answers Explained

11. A properly operating digester will produce 8 to 12 cu ft of gas for every pound of volatile matter added; and for every pound volatile matter destroyed, produce 12 to 18 cu ft of gas. This is dependent on the characteristics of the sludge.

12. $\text{Cu ft of gas/day divided by lb VS destroyed} = (150,000 \text{ gas produced cu ft/day}) / (17,500 \text{ VS destroyed lbs/day})$
(Digester volume is not needed for this specific example.)

13. Digester gas consists of about 65%-70% methane, 30%-35% carbon dioxide and a small percentage of hydrogen, nitrogen and other gases.

14. BTU value of digestion gas is a result of the methane composition.

15. An explosive atmosphere will happen with between 5%-15% methane mixed with 85%-95% atmospheric air.

(Questions composed using Operation of Wastewater Treatment Plants, Vol II, 7th ed.)