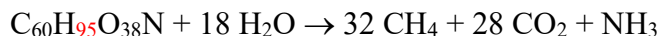


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ISBN: 978-1-947801-03-5
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Revisions are shown in red.

Question 24, p. 20:

The balanced equation and molecular weights for reactants and products in the anaerobic digestion of an organic material are as follows:



Compound	MW
$\text{C}_{60}\text{H}_{95}\text{O}_{38}\text{N}$	1,437
H_2O	18
CH_4	16
CO_2	44
NH_3	17

The weight (lb) of methane produced per 2,000 lb of organic material would be most nearly_____.

Question 35, p. 24:

- A. 160
- B. 250
- C. 300
- D. 420

Solution Table, p. 60:

Number 24 in the table should be 712–713.

Solution 4, p. 62:

Volume = 100.1 ml, 4 significant figures

Weight = 100.1 g, 4 significant figures

Pipette = 1.01 ml, 3 significant figures

THE CORRECT ANSWER IS: C

Solution 16, p. 67:

Refer to the Relationship Between Hardness and Tensile Strength section in the **Materials Science/Structure of Matter** chapter of the *FE Reference Handbook*.

By definition, a metal with high hardness has a high tensile and yield strength, as well as strong intermolecular bonding, with high impact, rebound, and scratch resistance strength.

THE CORRECT ANSWERS ARE: B, C, D, AND F

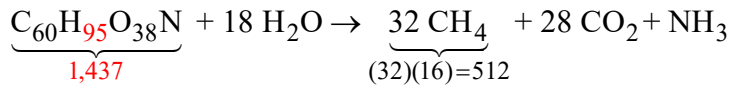
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Solution 17, p. 67:

Refer to the Corrosion section in the **Materials Science/Structure of Matter** chapter of the *FE Reference Handbook*. Aluminum is anodic relative to copper and therefore will corrode to protect the copper.

THE CORRECT ANSWER IS: B

Solution 24, p. 69:



$$CH_4 \text{ lb} = 2,000 \text{ lb} \left(\frac{512}{1,437} \right) = 712.6 \text{ lb}$$

THE CORRECT ANSWER IS: 712–713

Solution 35, p. 73:

Refer to the P-h diagram for Refrigerant HFC-134a in the Thermodynamics chapter of the *FE Reference Handbook*.

The enthalpy at 0.1 quality and 20°C = 250 kJ/kg.

The enthalpy at saturated **vapor** and 20°C = 410 kJ/kg.

$$410 - 250 = 160 \text{ kJ/kg}$$

THE CORRECT ANSWER IS: A

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Solution 60, p. 85:

The Dimensionless Group equation (Sherwood) is given in the Chemical Engineering section of the *FE Reference Handbook*.

$$\frac{k_m D}{D_m} = 0.023 \left(\frac{DV\rho}{\mu} \right)^{0.8} \left(\frac{\mu}{\rho D_m} \right)^{1/3}$$

Using the definitions of the Reynolds and Schmidt numbers, the following form of the equation is obtained:

$$\frac{k_m D}{D_m} = 0.023 \text{Re}^{0.8} \text{Sc}^{1/3}$$

$$\frac{k_m D}{D_m} = 0.023(30,000)^{0.8} (6)^{1/3} = 159.52$$

$$k_m = 159.52 \frac{D_m}{D} = 159.52 \frac{1 \times 10^{-5} \frac{\text{cm}^2}{\text{s}}}{5 \text{ cm}} = 3.19 \times 10^{-4} \frac{\text{cm}}{\text{s}} = 3.19 \times 10^{-4} \frac{\text{mol}}{\text{cm}^2 \cdot \text{s} \cdot \frac{\text{mol}}{\text{cm}^3}}$$

Assume that liquid in contact with the surface of the tube is at equilibrium concentration.

$$\begin{aligned} \text{Flux} &= k_m (C_{\text{surface}} - C_{\text{bulk}}) = 3.19 \times 10^{-4} \frac{\text{mol}}{\text{cm}^2 \cdot \text{s} \cdot \frac{\text{mol}}{\text{cm}^3}} \left(2 \times 10^{-4} \frac{\text{mol}}{\text{cm}^3} - 0 \frac{\text{mol}}{\text{cm}^3} \right) \\ &= 6.38 \times 10^{-8} \frac{\text{mol}}{\text{cm}^2 \cdot \text{s}} \left(\frac{100 \text{ cm}}{1 \text{ m}} \right)^2 = 6.38 \times 10^{-4} \text{ mol}/(\text{s} \cdot \text{m}^2) \end{aligned}$$

THE CORRECT ANSWER IS: A