

**Agriculture
Chemical Applications Quiz**

Name

Key

1. The first number on a fertilizer label is the percentage by weight of:

- A*
- ☒ A. nitrogen in the product
 - ☐ B. nitrate in the product
 - ☐ C. phosphorous in the product
 - ☐ D. ammonium in the product
 - ☐ E. potash in the product

2. A ten pound bag of 21-7-14 contains:

- B*
- ☐ A. 0.21 pounds of elemental nitrogen
 - ☒ B. 0.7 pounds of P_2O_5 (phosphorous) equivalent
 - ☐ C. 0.14 pounds of K_2O (potash) equivalent
 - ☐ D. 21 pounds of elemental nitrogen
 - ☐ E. both a and c

$$\frac{21(10)}{2.1}$$

$$\frac{.07(10)}{.7}$$

$$\frac{.14(10)}{1.4}$$

For the following scenarios, answer all parts of the question and show work.

3. A wheat grower has 164 acres of wheat to top-dress with 60-0-0 units of nitrogen using liquid nitrogen 28-0-0. Liquid nitrogen weighs 10.67 pounds per gallon.

- a. How many pounds of liquid nitrogen were applied per acre?
- b. How many total pounds of liquid nitrogen were applied?
- c. How many tons were used?

$$\frac{28x}{.28} = \frac{60}{.28}$$

$$x = 214 \text{ lbs per acre}$$

$$214 \text{ lb/acre} \times 164 \text{ acres} = [35,096 \text{ lbs}]$$

$$35,096 \text{ lbs} \div \frac{1 \text{ ton}}{2000 \text{ lbs}} = [17.5 \text{ tons}]$$

4. Answer the following questions using the following information:

- Your sprayer holds 30 gallons of spray material.
- The treatment area is 1.5 acres (43,560 sq ft = 1 acre) in size.
- The label rate for the pesticide is 5 ounces per 1,000 square feet.
- The application rate of the spray solution is 2 gallons per 1,000 square feet.

- a. How many total gallons of spray material will be needed to cover this area?
- b. How many total ounces of the pesticide will be used?
- c. How many tanks will it take to complete this job using the outputs given above?

$$1.5 \text{ acres} \cdot \frac{43560 \text{ ft}^2}{1 \text{ acre}} = 65340 \text{ ft}^2$$

$$65340 \text{ ft}^2 \cdot \frac{2 \text{ gal}}{1000 \text{ ft}^2} = \boxed{131 \text{ gal}}$$

$$65340 \text{ ft}^2 \cdot \frac{5 \text{ oz}}{1000 \text{ ft}^2} = \boxed{327 \text{ oz}}$$

$$131 \text{ gal} \div 30 \text{ gal} = 4.4 \quad \boxed{5 \text{ tanks}}$$

$$x + y = -12$$

5. Solve $2x - 3y = 6$

$$\begin{array}{l} -2(x + y = -12) \\ -2x - 2y = 24 \end{array}$$

$$\begin{array}{r} -2x - 2y = 24 \\ 2x - 3y = 6 \\ \hline -5y = 30 \\ \frac{-5y}{-5} = \frac{30}{-5} \\ y = -6 \end{array}$$

$$\begin{array}{r} x + y = -12 \\ x - 6 = -12 \\ \hline +6 \quad +6 \\ x = -6 \end{array}$$

$$(-6, -6)$$

6. A chemist has one solution which is 10% alcohol and another which is 20% alcohol. How many liters of each solution must be used to produce 30 L of a solution which is 14% alcohol?

	Solution 1 +	Solution 2 =	New Solution
Amount of mixture	x	y	30
* % of acid	.10	.20	.14
= total acid in mix	.1x	.2y	4.2

10% solution = 18 L

20% solution = 12 L

$$\begin{aligned} - .1(x + y) &= -30 \\ .1x + .2y &= 4.2 \end{aligned}$$

$$\begin{aligned} - .1x - .1y &= -3 \\ + .1x + .2y &= 4.2 \\ \hline .1y &= 1.2 \\ \frac{.1y}{.1} &= \frac{1.2}{.1} \\ y &= 12 \end{aligned}$$

$$\begin{aligned} x + y &= 30 \\ x + 12 &= 30 \\ -12 &\quad -12 \\ \hline x &= 18 \end{aligned}$$