

# Calculation.

Required nutrients.

Molecular mass.

- 1)  $KNO_3$  101.10 g/mol
- 2)  $MgSO_4$  120.33 g/mol
- 3)  $NH_3$  17.03 g/mol
- 4)  $H_3PO_4$  97.99 g/mol
- 5)  $NH_4H_2PO_4$  115.03 g/mol
- 6)  $Ca(NO_3)_2$  163.09 g/mol

- P or  $(PO_4^{3-})$  = 36.9 ± 6.2
- N = 321 ± 130
- $K^{2+}$  = 340 ± 101
- Ca = 160 ± 10
- $Mg^{2+}$  = 40.9 ± 3.3
- $SO_4^{2-}$  = 134 ± 5.3

1)  $KNO_3$

	Mol. mass of $KNO_3$	Atomic mass of K.	
K =	101.10	39	
	x	required K.	
		340	
	= $\frac{101.10 \times 340}{39}$		
	= 881.38		
$NO_3$ =	101.10	$14 + 16 \times 3 = 62$	
	x	321	
	= $\frac{101.10 \times 321}{62}$		
	523.43		

Total  $KNO_3 = 881.38$

Total  $KNO_3 = 523.43$

$523.43 = 321$

$881.38 = 340$

$881.38 = NO_3$

$523.43 = K$

$\frac{881.38 \times 321}{523.43} = NO_3$

$K = \frac{523.43 \times 340}{881.38}$

$NO_3 = 540$

$K = 201.91$

$K = 340$

$NO_3 = 321$

$KNO_3$

Percentage of K =  $\frac{38}{101.10} \times 100 = 37.58\%$

N =  $\frac{14}{101.10} \times 100 = 13.84\%$

$O_3 = \frac{16 \times 3}{101.10} \times 100 = 47.47\%$

$KNO_3 = 881.38 \times$

$K = \frac{881.38 \times 37.58}{100} = 331.2$

$N = \frac{881.38 \times 13.84}{100} = 121.9$



$$2) \text{ MgSO}_4 : \quad 120.33 \quad 24.30$$

$$\quad \quad \quad ? \quad 40.9$$

$$= \frac{120.33 \times 40.9}{24.30}$$

$$x = 202.53$$

$$\text{For SO}_4 : \quad 120.3 \quad 82.065 + 64 = 96.065$$

$$\quad \quad \quad x \quad 134$$

$$= \frac{120.33 \times 134}{96.065} = 167.84$$

$$\text{MgSO}_4 = 202.53$$

$$\text{Mg} = \frac{202.53 \times 20.19}{100} \%$$

$$= 40.9 \%$$

$$\text{SO}_4 : \quad \frac{202.53 \times 79.83}{100} \%$$

$$= 161.68$$

3)  $\text{NH}_3$ .

$$\begin{array}{r} \text{NH}_3 : \quad 17.03 \quad 14 + 3 \\ \quad \quad \quad \times \quad \quad \quad 321 \end{array}$$

$$x = \frac{17.03 \times 321}{17} = 321.56$$

$$\text{NH}_3 = 321$$

$$\text{N} = \frac{321.56 \times 82.2\%}{100} = 264.32$$

$$\text{H}_3 = \frac{321.56 \times 17.61}{100} = 56.64$$

4)  $\text{H}_3\text{PO}_4$ .

$$\begin{array}{r} \text{PO}_4 = \quad 97.99 \quad 30.9 + 64 = 94.9 \\ \quad \quad \quad \times \quad \quad \quad 36.9 \end{array}$$

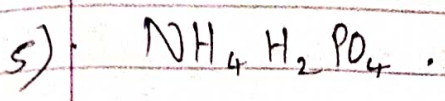
$$x = \frac{97.99 \times 36.9}{94.9}$$

$$= 38.10$$

$$\text{H}_3\text{PO}_4 = 38.10$$

$$\text{PO}_4 = \frac{38.10 \times 96.84}{100} = 36.89 \approx \boxed{36.9}$$





$$\text{NH}_4 = 115.03$$

$$\text{NH}_4 = 115.03 \quad (14 + 4)$$

$$\quad \quad \quad \times \quad \quad \quad 321$$

$$= 2,051.36$$

$$\text{PO}_4 = 115.03 \quad (30.9 + 64) \quad 94.9$$

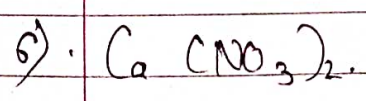
$$\quad \quad \quad \times \quad \quad \quad 36.9$$

$$= 44.72$$

$$\text{NH}_4\text{H}_2\text{PO}_4 = 2051.36$$

$$\text{NH}_4 = \frac{2051.36 \times 15.3}{100} = 320$$

$$\text{PO}_4 = \frac{2051.36 \times 96.84}{100} = 19.86$$



$$\text{Ca}(\text{NO}_3)_2 = 163.09$$

$$163.09 \quad 40.07$$

$$\times \quad \quad \quad 160$$

$$\times = 651.22$$

$$\frac{(NO_3)_2}{2} = \frac{163.09}{2} \times \frac{(14 + 48) \times 2}{321} = 422.19$$

$$Ca(NO_3)_2 = 651.22$$

$$Ca = \frac{651.22 \times 24.56}{100} = 159$$

$$\frac{(NO_3)_3}{3} = \frac{651.22 \times 76.03}{100} = 495.13$$

1)  $KNO_3 = 881.38 \text{ mg. (for 1 litre)}$

$K = 340.21 \text{ mg}$

$N = 120.7 \text{ mg}$

For 30 l =  $881.38 \times 30 \text{ litres} = 26441.4 \text{ mg}$   
 $= 26.44 \text{ gm}$

2)  $MgSO_4 = 202.53 \text{ mg}$

$Mg = 40.9$

$SO_4 = 161.68$

For 30 l =  $202.53 \times 30 \text{ litres} = 6075.9 \text{ mg}$   
 $= 6.07 \text{ gm}$



$$3) \text{NH}_3 = 321.56.$$

$$\text{N} = 264.32$$

$$\text{H}_3 = 56.64.$$

$$\begin{aligned} \text{For 30 litre} &= 321.56 \times 30 \text{ l} = 9646.8 \text{ mg.} \\ &= 9.646 \text{ gm} \end{aligned}$$

$$4) \text{H}_3\text{PO}_4 = 38.10.$$

$$\text{PO}_4 = 38.10.$$

$$\begin{aligned} \text{For 30 litres} &= 38.10 \times 30 \text{ l} \\ &= 1143.0 \text{ mg} \\ &= 1.14 \text{ gm.} \end{aligned}$$

$$5) \text{NH}_4\text{H}_2\text{PO}_4 = 2051.36 \text{ mg.}$$

$$\text{NH}_4 = 320$$

$$\text{PO}_4 = 19.86.$$

$$\begin{aligned} \text{For 30 lit.} &= 2051.36 \times 30 \text{ litre} = 61540.8 \text{ mg} \\ &= 61.5 \text{ gm.} \end{aligned}$$

$$6) (\text{Ca}(\text{NO}_3)_2 = 651.22 \text{ mg.}$$

$$\text{Ca} = 159$$

$$(\text{NO}_3)_2 = 495.13.$$

$$\begin{aligned} \text{For 30 lit} &= 651.22 \times 30 \text{ l.} \\ &= 19536.6 \text{ mg.} \\ &= 19.53 \text{ gm.} \end{aligned}$$

$$\begin{aligned} (651.22 - 352) \text{ mg} &= 299.22 \text{ mg} \\ &\text{(basic)} \end{aligned}$$

pH = 7.87

1ml  $\text{HNO}_3$  :- pH = 7.48

3ml  $\text{HNO}_3$  :- pH = 7.03

5ml  $\text{HNO}_3$  :- pH = 6.49