How much KNO3 must be dissolved in 100 g of water at 40 degrees Celsius to create a saturated solution?

According to the reference 1 solubility of KNO_3 at 40 degrees Celsius is 38.6, in this reference solubility has following definition:

$$Solubility(KNO3) = \frac{m(KNO3) \times 100}{m(H2O) + m(KNO3)} = 38.6$$

From this equation we need to find $m(KNO_3)$. Based on the solubility formula we will create equation using **x** as m(KNO3)and 100 as m(H₂O):

$\frac{x \times 100}{100+x} = 38.6$ $\qquad$ $38.6 \times (100 + x) = x \times 100$ $\quad$ $3860 + 38.6x = 100x$

$100x - 38.6x = 3860$ $\qquad$ $61.4x = 3860$ $\qquad$ $x = \frac{3860}{61.4} = 62.9$

Answer: 62.9 g of KNO3 must be dissolved in 100 g of water at 40 degrees Celsius to create saturated solution.

Reference 1. W.M. Haynes. (2016). CRC Handbook of Chemistry and Physics. CRC Press. page 5-169

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