Task:

determine the mass of potassium carbonate which must be dissolved in distilled water to make 250cm of potassium carbonate solution with a concentration of 0.2 mol dm3

Solution:

The molarity of solution is
C (M) = n (mol) / V(L)

C – molarity (M)

n – number of moles of substance

V- volume of solution (L)

First of all we have to convert mol/dm^3 to mol/L

1 dm^3 = 1 L

C (K_2CO_3) = 0.2 mol/dm^3 = 0.2mol/ L = 0.2 mol/L

Also we have to convert volume in cm3 to L

1cm^3 = 1 mL = 1 · 10^{-3} L

V(solution) = 250 mL = 250 · 10^{-3} L = 0.250 L

The number of moles of K_2CO_3 is
n (mol) = C (M) · V(L)

n(K_2CO_3) = 0.2 · 0.250 = 0.05 mol

The mass of K_2CO_3 is
m(g) = n(mol) · MW(g/mol)

The molar weight consists of atomic weights of elements taken from the periodic table
MW(K_2CO_3) = 2 · MW(K) + MW(C) + 3 · MW(O) = 2 · 39 + 12 + 3 · 16= 138 g/mol

m(K_2CO_3) = 0.05 · 138 = 6.9 g

Answer: m(K_2CO_3) = 6.9 g