

Answer on Question #64925, Chemistry / General Chemistry

Question:

Calculate the number of moles represented by 20.0 mg of caffeine, whose molecular formula is $C_8H_{10}N_4O_2$

Solution:

1) Find the molecular mass of caffeine M:

$$M = (8 \times 12) + (10 \times 1) + (4 \times 14) + (2 \times 16) = 194.$$

So 1 mole of caffeine weighs 194 g.

2) Find number of moles of caffeine:

$$20.0 \text{ mg} = 2.00 \times 10^{-2} \text{ g}.$$

$$\text{If } 194 \text{ g is 1 mole of caffeine then } 2.00 \times 10^{-2} \text{ g is } (2.00 \times 10^{-2}) \text{ g} \times 1 \text{ mol} / 194 \text{ g} = 1.03 \times 10^{-4} \text{ mol}.$$

Answer:

20.0 mg of caffeine is 1.03×10^{-4} moles.

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