Introduction to the Mole Worksheet

Answer the following questions.

1. How many moles are there in a 124 g sample of C_8H_{18}?

2. If 3.25 x 10^{21} molecules of a solid has a mass of 0.229 g, what is its molar mass?

3. What is the mass of 5.99 mol of $C_6H_2Cl_4$?

4. How many moles in 4.114 x 10^{87} molecules of nitrogen trifluoride?

5. How many atoms are there in 12 molecules of cobalt(II) sulphate pentahydrate?

6. How many molecules in 3 kg of potassium iodide?

7. How many moles are there in 215 grams of water?

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Answers

1. How many moles are there in a 124 g sample of C_8H_{18}?

   Molar mass of C_8H_{18} = 114 grams

   Number of moles in 124 g of C_8H_{18} = 124/114 = 1.09 moles

2. If 3.25×10^{21} molecules of a solid has a mass of 0.229 g, what is its molar mass?

   Molar mass of the solid = {0.229/(3.25 x 10^{21})} x 6.023 x 10^{23} = 42.4 grams/mol

3. What is the mass of 5.99 mol of $C_6H_2Cl_4$?

   Molar mass of $C_6H_2Cl_4$ = 215.89 grams

   The mass of 5.99 mol of $C_6H_2Cl_4$ = 215.89 x 5.99 = 1293 grams/ mol

4. How many moles in 4.114×10^{87} molecules of nitrogen trifluoride?

   Number of moles = (4.114 x 10^{87})/(6.023 x 10^{23}) = 0.683 x 10^{64} = 6.83 x 10^{63}

5. How many atoms are there in 12 molecules of cobalt(II) sulphate pentahydrate?

   Number of atoms = 12 x number of atoms in a single molecule of cobalt(II) sulphate pentahydrate = 12 x (1 atom of Co + 1 atom of S + 9 atoms of O + 10 atoms of H) = 12 x 21 = 252 atoms

6. How many molecules in 3 kg of potassium iodide?

   Molar mass of potassium iodide = 166 grams

   166 grams of potassium iodide has 6.023 x 10^{23} molecules

   3000 grams of potassium iodide has 108 x 10^{23} molecules = 1.08 x 10^{25} molecules

7. How many moles are there in 215 grams of water?

   Molar mass of water = 18 grams

   Number of moles in 215 grams of water = 215/18 = 11.9 moles