Mole Problems Worksheet

Answer the following questions.

1. Determine the number of moles in 78.5 g of potassium benzoate ($C_7H_5KO_2$).

2. Determine the number of molecules in 5.25 moles of water (H_2O).

3. Determine the number of moles of sodium ions in 0.565 moles of Na_2SO_4.

4. Determine the number of moles in 3.77 x 10^{23} molecules of H_2O.

5. Determine the number of hydrogen atoms in 15 molecules of benzene.

6. Determine the mass of 0.875 mol of iodine.

7. Determine the number of moles in 12.98 g of methane.

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1. Determine the number of moles in 78.5 g of potassium benzoate ($C_7H_5KO_2$).
   The molar mass of Potassium Benzoate = (7 x C) + (5 x H) + (1 x K) + (2 x O) =
   (7 x 12) + (5 x 1) + (1 x 39) + (2 x 16) = 84 + 5 + 39 + 32 = 160 g/mol
   Number of moles in 78.5 g of $C_7H_5KO_2$ = (78.5/160) = 0.49 moles of $C_7H_5KO_2$.

2. Determine the number of molecules in 5.25 moles of water (H_2O).
   The number of molecules present in 5.25 moles of water (H_2O) = 5.25 x 6.023 x 10^{23} =
   3.16 x 10^{24}

3. Determine the number of moles of sodium ions in 0.565 moles of Na_2SO_4.
   After dissociating Na_2SO_4 produces two Na^+ ions. So the number of moles in 0.565
   moles of Na_2SO_4 = 2 x 0.565 = 1.13 moles

4. Determine the number of moles in 3.77 x 10^{23} molecules of H_2O.
   The number of moles in 3.77 x 10^{23} molecules of H_2O = (3.77 x 10^{23})/(6.023 x 10^{23}) =
   0.626 moles

5. Determine the number of hydrogen atoms in 15 molecules of benzene.
   The number of hydrogen atoms in a single molecule of benzene = 6
   The number of hydrogen atoms in 15 molecules of benzene = 15 x 6 = 90

6. Determine the mass of 0.875 mol of iodine.
   1 mole of iodine weighs 127 grams.
   The mass of 0.875 moles of iodine = 2 x 0.875 moles x 127 grams/mol = 222.25 grams

7. Determine the number of moles in 12.98 g of methane.
   1 mole of methane weighs 16 grams.
   The number of atoms in 12.98 grams of CH_4 = 12.98/16 moles = 0.811 moles