Mole Worksheet

Use two decimal places for the molar masses and report your answer to the correct number of significant figures.

I. Calculate either the number of grams or the number of moles.

1) **3.00 mol NH_3**

2) **9.02 mol H_2O**

3) **0.2000 mol SO_3**

4) **0.0106 mol NO_2**

5) **6.0 mol $MgCl_2$**

6) **12.7 g I_2**

7) **8.00 g NaOH**

8) **5.657 g H_2SO_4**

9) **32 g KNO_3**

10) **28.4 g $C_{12}H_{22}O_{11}$**

II. Answer the following questions.

1) **An amount of carbon containing Avogadro's number of carbon atoms has a mass of _____ .**

2) **The molar mass of CO_2 is 44.01 g. Therefore, one mole of carbon dioxide has a mass of _____ , and 0.500 mole has a mass of _____ .**

3) **A sample of water containing 6.02×10^{23} molecules has a mass of _____ . This amount of water is one standard reacting unit of water or to use the scientific term, one _____ .**

4) **Sodium chloride has the formula NaCl and is an ionic compound. Its molar mass is 58.44 g. One formula unit of sodium chloride consists of one _____ , whose chemical symbol is _____ and one _____ whose chemical symbol is _____ .**

5) **A sample of sodium chloride containing 6.02×10^{23} of these formula units has a mass of _____. This amount of sodium chloride is one standard reacting unit or to use the scientific term, one _____ .**

6) **The smallest representative sample of a covalent substance such as water is called a _____. A sample of a covalent compound that contains Avogadro's number of these tiny particles make up one _____ of that substance.**

7) **Compounds X, Y, and Z have the following molar masses: X = 50.00 g, Y = 100.00 g, and Z = 150.00 g. Assume they are covalent compounds and therefore consist of molecules.**

   (a) Suppose you had 50.00 g of X, 100.00 g of Y, and 150.00 g of Z in separate containers. What would each of these samples have in common?

   (b) Suppose you had 100.00 g of Y and 100.00 g of X in separate containers. Which container would have the greater number of molecules? Why?

   (c) An individual molecule of Z has a mass that is _____ times as much as the mass of a molecule of X.

8) If a 40.0 g sample of substance A is known to contain the same number of molecules as a 120.0 g sample of substance B, then the molar mass of A must be related to the molar mass of B in which way? The molar mass of A is:
(a) equal to the molar mass of B
(b) one-third the molar mass of B
(c) three times the molar mass of B
(d) 4.8 times the formula mass of B

9) The atoms of element A are one-third as heavy as the atoms of C-12. The molar mass of A is:
(a) 36.00 g
(b) 3.00 g
(c) 4.00 g
(d) 12.00 g

Solutions

I. Calculate either the number of grams or the number of moles.

1) **m = 3.00 ~~mol NH_3~~ x 17.04 g NH_3/1 ~~mol NH_3~~ = 51.1 g NH_3**

2) **m = 9.02 ~~mol H_2O~~ x 18.02 g H_2O/1 ~~mol H_2O~~ = 163 g H_2O**

3) **m = 0.2000 ~~mol SO_3~~ x 80.06 g SO_3/1 ~~mol SO_3~~ = 16.01 g SO_3**

4) **m = 0.0106 ~~mol NO_2~~ x 46.01 g NO_2/1 ~~mol NO_2~~ = 0.488 g NO_2**

5) **m = 6.0 ~~mol $MgCl_2$~~ x 95.21 g $MgCl_2$/1 ~~mol $MgCl_2$~~ = 570 g $MgCl_2$**

6) **n = 12.7 ~~g I_2~~ x 1 mol I_2/253.83 ~~g I_2~~ = 0.0500 mol I_2**

7) **n = 8.00 ~~g NaOH~~ x 1 mol NaOH/40.00 ~~g NaOH~~ = 0.200 mol NaOH**

8) **n = 5.657 ~~g H_2SO_4~~ x 1 mol H_2SO_4/98.08 ~~g H_2SO_4~~ = 0.05768 mol H_2SO_4**

9) **n = 32 ~~g KNO_3~~ x 1 mol KNO_3/101.11 ~~g KNO_3~~ = 0.32 mol KNO_3**

10) **n = 28.4 g $C_{12}H_{22}O_{11}$ x 1 mol $C_{12}H_{22}O_{11}$/342.34 g $C_{12}H_{22}O_{11}$ =**

0.830 mol $C_{12}H_{22}O_{11}$

II. Answer the following questions.

1) **12.01 g**

2) **44.01 g; 22.00 g**

3) **18.02 g; mole**

4) **sodium ion; Na^+; chloride ion; Cl^-**

5) **58.44 g; mole**

6) **molecule; mole**

7) **(a) Each would contain 1.00 mol or 6.02×10^{23} molecules.**

   (b) X would have twice as many as you would have 2.00 mol of X.

   (c) 3; 3

8) **(b) one-third the molar mass of B**

9) **(c) 4.00 g**