GENERAL CHEMISTRY MOLES PRACTICE TEST NAME KEY

SHOW YOUR WORK, INCLUDE UNITS, AND CIRCLE YOUR ANSWERS

1. How many representative particles are present in one mole of any substance? 6.02×10^{23}

2. What is the mass in **amu's** of one molecule of carbon dioxide (CO_2)? 44 amu

3. What is the mass in **grams** of one mole of carbon dioxide (CO_2)? 44 g

4. Give the name of the representative particle for each of the following types of pure substances.

ELEMENT atoms

IONIC COMPOUND formula units

COVALENT COMPOUND molecules

5. Calculate the molar mass of:

5A. Na_3PO_4

Na: $3 \times 23 = 69$
P: $1 \times 31 = 31$
O: $4 \times 16 = 64$
164 g

5B. NH_4Cl

N: $1 \times 14 = 14$
H: $4 \times 1 = 4$
Cl: $1 \times 35.5 = 35.5$
53.5 g

6. How many moles are present in 253 grams of Na_2CO_3?

Na: $2 \times 23 = 46$
C: $1 \times 12 = 12$
O: $3 \times 16 = 48$
106

$$253\text{ g } Na_2CO_3 \times \frac{1\text{ mol } Na_2CO_3}{106\text{ g } Na_2CO_3} = 2.38\text{ mol } Na_2CO_3$$

7. How many grams are present in 5.0 moles of $C_{12}H_{22}O_{11}$?

C: $12 \times 12 = 144$
H: $22 \times 1 = 22$
O: $11 \times 16 = 176$
342 g/mol

$$5.0\text{ mol } C_{12}H_{22}O_{11} \times \frac{342\text{ g } C_{12}H_{22}O_{11}}{1\text{ mol } C_{12}H_{22}O_{11}} = 1710\text{ g } C_{12}H_{22}O_{11}$$

8. How many grams of P_2O_4 are present in 3.52×10^{24} molecules of P_2O_4?

$$3.52 \times 10^{24}\text{ m.c. } P_2O_4 \times \frac{1\text{ mol } P_2O_4}{6.02 \times 10^{23}\text{ m.c. } P_2O_4} \times \frac{126\text{ g } P_2O_4}{1\text{ mol } P_2O_4} = 736.74\text{ g } P_2O_4$$

9A. Determine the % composition of each element in the compound $(NH_4)_2C_2O_4$

N: $2 \times 14 = 28$
H: $8 \times 1 = 8$
C: $2 \times 12 = 24$
O: $4 \times 16 = 64$
124 g

N 22.6 %
H 6.5 %
C 19.4 %
O 51.6 %

9B. You are required to extract the nitrogen from a 50.0 gram sample of $(NH_4)_2C_2O_4$. How many grams of nitrogen could you recover?

$$22.6\% \times 50\text{ g} = 11.3\text{ g N}$$

NAME KEY MOLES QUIZ

1. One mole is defined as the number 6.02×10^{23}.

2. What is the mass in amu of one molecule of water (H_2O)?

18 amu

3. What is the mass in grams of one mole of H_2O?

18 grams

4. Give the name of the representative particle for each of the following types of pure substances.

ELEMENT atom

IONIC COMPOUND formula unit

COVALENT COMPOUND molecule

5. Calculate the molar mass of $Al_2(SO_3)_3$.

Al: $2 \times 27 = 54$
S: $3 \times 32 = 96$
O: $9 \times 16 = 144$
294 g

6. Calculate the molar mass of $Sn_3(PO_3)_4$

Sn: $3 \times 118.7 = 356.1$
P: $4 \times 31 = 124$
O: $12 \times 16 = 192$
672.1 g

7. How many moles of Carbon (C) are present in a in a 10.0 gram sample?

$$10 \text{ g C} \times \frac{1 \text{ mol}}{12 \text{ g C}} = .833 \text{ mol C}$$

8. What is the mass of 2.54 moles of Ca_2SO_4?

$$2.54 \text{ mol } Ca_2SO_4 \times \frac{176 \text{ g } Ca_2SO_4}{1 \text{ mol } Ca_2SO_4} = 447.04 \text{ g } Ca_2SO_4$$

9. How many grams of N_2O_4 are present in 1.3×10^{24} molecules of N_2O_4?

$$1.3 \times 10^{24} \text{ m.c. } N_2O_4 \times \frac{1 \text{ mol } N_2O_4}{6.02 \times 10^{23} \text{ m.c. } N_2O_4} \times \frac{92 \text{ g } N_2O_4}{1 \text{ mol } N_2O_4} = 198.7 \text{ g } N_2O_4$$

10. How many formula units are present in 54 grams of Al_2O_3?

$$54 \text{ g } Al_2O_3 \times \frac{1 \text{ mol } Al_2O_3}{102 \text{ g } Al_2O_3} \times \frac{6.02 \times 10^{23} \text{ f.u. } Al_2O_3}{1 \text{ mol } Al_2O_3} = 3.18 \times 10^{23} \text{ f.u. } Al_2O_3$$