Name Key Date _____ Class _____

# 10–2 Review and Reinforcement

## *Mole Conversions*

*Answer each of the following questions in the space provided.*

1. How would you calculate the number of moles present in a given mass of a substance?

$g \times \frac{1\ mol}{\text{Molar Mass } g} = \#\ mol$

2. How would you calculate the number of particles present in a given number of moles of a substance?

$mol \times \frac{6.02 \times 10^{23}\ particles}{1\ mol} = \#\ particles$

3. How would you calculate the number of particles present in a given mass of a substance?

$g \times \frac{1\ mol}{\text{Molar Mass } g} \times \frac{6.02 \times 10^{23}\ particles}{1\ mol} = \#\ particles$

*Complete each of the following conversions as directed. Show all your work.*

4. 3.5 mol C = 42 g C

$3.5\ mol\ C \times \frac{12.01\ g\ C}{1\ mol\ C} = 42\ g\ C$

5. $1.6 \times 10^{24}$ molecules $FeCl_3$ = 2.7 mol $FeCl_3$

$1.6 \times 10^{24}\ molec\ FeCl_3 \times \frac{1\ mol\ FeCl_3}{6.02 \times 10^{23}\ molec.} = 0.27 \times 10^{1}\ mol = 2.7\ mol\ FeCl_3$

6. 27.6 g Ar = 0.691 mol Ar

$27.6\ g\ Ar \times \frac{1\ mol\ Ar}{39.95\ g\ Ar} = 0.691\ mol\ Ar$

7. 4.10 mol $BaSO_4$ = $2.47 \times 10^{24}$ formula units $BaSO_4$

$4.10\ mol\ BaSO_4 \times \frac{6.02 \times 10^{23}\ form.\ u.}{1\ mol} = 24.7 \times 10^{23} = 2.47 \times 10^{24}$

8. $16.5 \times 10^{23}$ atoms Zn = 2.74 mol Zn

$16.5 \times 10^{23}\ atom\ Zn \times \frac{1\ mol\ Zn}{6.02 \times 10^{23}\ \frac{atom}{Zn}} = 2.74\ mol\ Zn$

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## 10–2 *Review and Reinforcement (continued)*

9. 0.0621 mol $K_2S$ = 6.85 g $K_2S$

$$0.0621\,\text{mol}\,K_2S \times \frac{110.27\,\text{g}\,K_2S}{1\,\text{mol}\,K_2S} = 6.85\,\text{g}\,K_2S$$

10. 65.8 g Mg = $1.63 \times 10^{24}$ atoms Mg

$$65.8\,\text{g Mg} \times \frac{1\,\text{mol Mg}}{24.31\,\text{g Mg}} \times \frac{6.02\times10^{23}\,\text{atom Mg}}{1\,\text{mol Mg}} = 16.3\times10^{23}$$

$$= 1.63\times10^{24}\,\text{atom}$$

***Solve each of the following problems as directed. Show all your work.***

11. Calculate the number of atoms in 0.40 mol of sulfur.

$$0.40\,\text{mol S} \times \frac{6.02\times10^{23}\,\text{atom S}}{1\,\text{mol S}} = 2.4\times10^{23}\,\text{atom S}$$

12. Calculate the number of atoms in 2.30 mol of silver.

$$2.30\,\text{mol Ag} \times \frac{6.02\times10^{23}\,\text{atom Ag}}{1\,\text{mol Ag}} = 1.38\times10^{24}\,\text{atom Ag}$$

13. You have a tank of $NO_2$ gas. If the tank contains 5 mol of the gas, how many atoms are in it?

$$5\,\text{mol NO} \times \frac{6.02\times10^{23}\,\text{molec NO}}{1\,\text{mol NO}} \times \frac{2\,\text{atom}}{1\,\text{molec NO}} = 6\times10^{24}\,\text{atom}$$

14. A recipe for chili calls for 3 g of sodium chloride. How many formula units of NaCl is that?

$$3\,\text{g NaCl} \times \frac{1\,\text{mol NaCl}}{58.44\,\text{g NaCl}} \times \frac{6.02\times10^{23}\,\text{form. u. NaCl}}{1\,\text{mol NaCl}} = 0.3\times10^{23}$$

$$= 3\times10^{22}\,\text{form. u.}$$

15. If you used 30.6 g of methanol ($CH_3OH$) to start a fire, how many molecules did you use?

$$30.6\,\text{g}\,CH_3OH \times \frac{1\,\text{mol}}{32.05\,\text{g}} \times \frac{6.02\times10^{23}\,\text{molec.}}{1\,\text{mol}} = 5.75\times10^{23}\,\text{molec}\,CH_3OH$$

16. A storage tank with a volume of 500. L contains how many moles of He at STP?

$$500.\,\text{L} \times \frac{1\,\text{mol}}{22.4\,\text{L}} = 22.3\,\text{mol He}$$

17. A chemical reaction between acetic acid and calcium carbonate produces 0.76 mol of $CO_2$ at STP. How many liters of gas were produced?

$$0.76\,\text{mol}\,CO_2 \times \frac{22.4\,\text{L}}{1\,\text{mol}} = 17\,\text{L}\,CO_2$$

18. In an experiment, 12.1 g of dry ice (solid $CO_2$) were converted into gaseous $CO_2$ at STP. How many moles were in the sample? What was the volume of gaseous $CO_2$?

$$12.1\,\text{g}\,CO_2 \times \frac{1\,\text{mol}}{44.01\,\text{g}\,CO_2} = 0.275\,\text{mol}\,CO_2$$

$$0.275\,\text{mol}\,CO_2 \times \frac{22.4\,\text{L}}{1\,\text{mol}} = 6.16\,\text{L}\,CO_2$$