

EXTRA PRACTICE: 2-Step Mole Conversions

Name: _____

Solve the following mole conversion problems. Be sure to show your work & include correct units.

Part I: Particles <--> Mole

1. How many moles of cobalt are present in
- 5.44×10^{26}
- atoms of cobalt?

$$\frac{5.44 \times 10^{26} \text{ atoms cobalt}}{1} \times \frac{1 \text{ mol Co}}{6.02 \times 10^{23} \text{ atoms Co}} = 904 \text{ mol Co}$$

2. How many molecules of carbon dioxide are in 2.40 moles of carbon dioxide?

$$\frac{2.40 \text{ mol CO}_2}{1} \times \frac{6.02 \times 10^{23} \text{ molecules CO}_2}{1 \text{ mol CO}_2} = 1.44 \times 10^{24} \text{ molecule CO}_2$$

3. How many moles of sulfur trioxide are in
- 4.56×10^{24}
- molecules of sulfur trioxide?

$$\frac{4.56 \times 10^{24} \text{ molecule SO}_3}{1} \times \frac{1 \text{ mol SO}_3}{6.02 \times 10^{23} \text{ molecule SO}_3} = 7.57 \text{ mol SO}_3$$

4. How many formula units (f.u.) are in 10.9 moles of copper (II) sulfate?

$$\frac{10.9 \text{ mol CuSO}_4}{1} \times \frac{6.02 \times 10^{23} \text{ fu CuSO}_4}{1 \text{ mol CuSO}_4} = 6.56 \times 10^{24} \text{ fu CuSO}_4$$

5. How many moles of sodium chloride are in
- 5.33×10^{25}
- formula units (f.u.) of sodium chloride?

$$\frac{5.33 \times 10^{25} \text{ fu NaCl}}{1} \times \frac{1 \text{ mol NaCl}}{6.02 \times 10^{23} \text{ fu NaCl}} = 88.5 \text{ mol NaCl}$$

6. How many atoms of carbon are present in 2.40 moles of carbon?

$$\frac{2.40 \text{ mol C}}{1} \times \frac{6.02 \times 10^{23} \text{ atoms C}}{1 \text{ mol C}} = 1.44 \times 10^{24} \text{ atoms C}$$

7. How many moles of carbon tetrachloride are in
- 9.11×10^{25}
- molecules of carbon tetrachloride?

$$\frac{9.11 \times 10^{25} \text{ molecules CCl}_4}{1} \times \frac{1 \text{ mol CCl}_4}{6.02 \times 10^{23} \text{ molecule CCl}_4} = 151 \text{ mol CCl}_4$$

8. How many formula units (f.u.) of calcium sulfate are in 2.90 moles of calcium sulfate?

$$\frac{2.90 \text{ mol CaSO}_4}{1} \times \frac{6.02 \times 10^{23} \text{ fu CaSO}_4}{1 \text{ mol CaSO}_4} = 1.75 \times 10^{24} \text{ fu CaSO}_4$$

9. How many moles of potassium fluoride are in
- 5.55×10^{24}
- formula units (f.u.) of potassium fluoride?

$$\frac{5.55 \times 10^{24} \text{ fu KF}}{1} \times \frac{1 \text{ mol KF}}{6.02 \times 10^{23} \text{ fu KF}} = 9.22 \text{ mol KF}$$

10. How many molecules of bromine are in 4.65 moles of bromine?

$$\frac{4.65 \text{ mol Br}_2}{1} \times \frac{6.02 \times 10^{23} \text{ molecules Br}_2}{1 \text{ mol Br}_2} = 2.80 \times 10^{24} \text{ molecules Br}_2$$

Part II: Mass <--> Mole

11. How many moles of water are present in 100. grams of water?

$$\frac{100 \text{ g H}_2\text{O}}{1} \times \frac{1 \text{ mol H}_2\text{O}}{18.016 \text{ g H}_2\text{O}} = 5.55 \text{ mol H}_2\text{O}$$

12. How many grams of water are in 27.7 moles of water?

$$\frac{27.7 \text{ mol H}_2\text{O}}{1} \times \frac{18.016 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 499 \text{ g H}_2\text{O}$$

13. How many moles of magnesium chloride are in 250. grams of magnesium chloride?

$$\frac{250 \text{ g MgCl}_2}{1} \times \frac{1 \text{ mol MgCl}_2}{95.21 \text{ g MgCl}_2} = 2.63 \text{ mol MgCl}_2$$

14. How many grams of diphosphorus pentoxide are in $1.89 \text{ E } -3$ moles of diphosphorus pentoxide?

$$\frac{1.89 \text{ E } -3 \text{ mol P}_2\text{O}_5}{1} \times \frac{141.94 \text{ g P}_2\text{O}_5}{1 \text{ mol P}_2\text{O}_5} = 0.268 \text{ g P}_2\text{O}_5$$

15. How many moles of butane (C_4H_{10}) are in 0.266 grams of butane?

$$\frac{0.266 \text{ g C}_4\text{H}_{10}}{1} \times \frac{1 \text{ mol C}_4\text{H}_{10}}{58.12 \text{ g C}_4\text{H}_{10}} = 0.00458 \text{ mol C}_4\text{H}_{10}$$

16. How many grams of calcium sulfate are in 0.993 moles of calcium sulfate?

$$\frac{0.993 \text{ mol CaSO}_4}{1} \times \frac{136.14 \text{ g CaSO}_4}{1 \text{ mol CaSO}_4} = 135 \text{ g CaSO}_4$$

17. How many moles of iron are present in $1.20 \text{ E } -4$ grams of iron?

$$\frac{1.20 \text{ E } -4 \text{ g Fe}}{1} \times \frac{1 \text{ mol Fe}}{55.85 \text{ g Fe}} = 2.15 \text{ E } -6 \text{ mol Fe}$$

18. How many grams of methane gas (CH_4) are in 13.4 moles of methane gas?

$$\frac{13.4 \text{ mol CH}_4}{1} \times \frac{16.042 \text{ g CH}_4}{1 \text{ mol CH}_4} = 215 \text{ g CH}_4$$

19. How many moles of aluminum iodide are present in 275 grams of aluminum iodide?

$$\frac{275 \text{ g AlI}_3}{1} \times \frac{1 \text{ mol AlI}_3}{407.68 \text{ g AlI}_3} = 0.675 \text{ mol AlI}_3$$

20. How many grams of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) are in 0.141 moles of glucose?

$$\frac{0.141 \text{ mol C}_6\text{H}_{12}\text{O}_6}{1} \times \frac{180.156 \text{ g C}_6\text{H}_{12}\text{O}_6}{1 \text{ mol C}_6\text{H}_{12}\text{O}_6} = 25.4 \text{ g C}_6\text{H}_{12}\text{O}_6$$