ANSWER KEY

EXTRA PRACTICE: 3-Step Mole Conversions Mixed Practice #2 Name: _____

Solve the following problems. Be sure to show all of your work and include correct units!

1. How many grams of calcium nitrate are in 3.24 X 10^{23} formula units (f.u.) of calcium nitrate?

$$\frac{3.24\text{ E }23\text{ fu } Ca(NO_3)_2}{1} \cdot \frac{1\text{ mol } Ca(NO_3)_2}{6.02\text{ E }23\text{ fu } Ca(NO_3)_2} \cdot \frac{164.088\text{ g } Ca(NO_3)_2}{1\text{ mol } Ca(NO_3)_2} = \boxed{88.3\text{ g } Ca(NO_3)_2}$$

2. How many atoms of copper are in 3.00 grams of copper?

$$\frac{3.00\text{ g Cu}}{1} \cdot \frac{1\text{ mol Cu}}{63.546\text{ g Cu}} \cdot \frac{6.02\text{ E }23\text{ atoms Cu}}{1\text{ mol Cu}} = \boxed{2.84\text{ E }22\text{ atoms Cu}}$$

3. How many grams of sulfur dioxide are in 1.12 X 10^{23} molecules of sulfur dioxide?

$$\frac{1.12\text{ E }23\text{ molecules } SO_2}{1} \cdot \frac{1\text{ mol } SO_2}{6.02\text{ E }23\text{ molecules } SO_2} \cdot \frac{64.058\text{ g } SO_2}{1\text{ mol } SO_2} = \boxed{11.9\text{ g } SO_2}$$

4. How many nitric acid formula units (f.u.) are in 4.20 grams of nitric acid?

$$\frac{4.20\text{ g } HNO_3}{1} \cdot \frac{1\text{ mol } HNO_3}{63.012\text{ g } HNO_3} \cdot \frac{6.02\text{ E }23\text{ fu } HNO_3}{1\text{ mol } HNO_3} = \boxed{4.01\text{ E }22\text{ fu } HNO_3}$$

5. How many molecules of laughing gas (dinitrogen monoxide) are in 1.78 E 23 grams of laughing gas?

$$\frac{1.78\text{ E }23\text{ g } N_2O}{1} \cdot \frac{1\text{ mol } N_2O}{44.01\text{ g } N_2O} \cdot \frac{6.02\text{ E }23\text{ molecule } N_2O}{1\text{ mol } N_2O} = \boxed{2.44\text{ E }45\text{ molecule } N_2O}$$

6. How many grams of silver nitrate are in 3.44 X 10^{22} formula units (f.u.) of silver nitrate?

$$\frac{3.44\text{ E }22\text{ fu } AgNO_3}{1} \cdot \frac{1\text{ mol } AgNO_3}{6.02\text{ E }23\text{ fu } AgNO_3} \cdot \frac{169.874\text{ g } AgNO_3}{1\text{ mol } AgNO_3} = \boxed{9.71\text{ g } AgNO_3}$$

7. How many grams of water are in 3.77 X 10^{23} molecules of pure water?

$$\frac{3.77\,E23 \text{ molecule } H_2O}{1} \cdot \frac{1 \text{ mol } H_2O}{6.02\,E23 \text{ molecule } H_2O} \cdot \frac{18.016 \text{ g } H_2O}{1 \text{ mol } H_2O} = \boxed{11.3 \text{ g } H_2O}$$

8. How many atoms of Tungsten are in 5.69 grams of Tungsten?

$$\frac{5.69 \text{ g W}}{1} \cdot \frac{1 \text{ mol W}}{183.85 \text{ g W}} \cdot \frac{6.02\,E23 \text{ atoms W}}{1 \text{ mol W}} = \boxed{1.86\,E22 \text{ atoms W}}$$

9. How many ammonium sulfide formula units (f.u.) are in 7.35 grams of ammonium sulfide?

$$\frac{7.35 \text{ g } (NH_4)_2S}{1} \cdot \frac{1 \text{ mol } (NH_4)_2S}{68.137 \text{ g } (NH_4)_2S} \cdot \frac{6.02\,E23 \text{ fu } (NH_4)_2S}{1 \text{ mol } (NH_4)_2S} = \boxed{6.49\,E22 \text{ fu } (NH_4)_2S}$$

10. How many molecules of phosphorus pentachloride are in 1.09 x 10^{23} grams of this substance?

$$\frac{1.09\,E23 \text{ g } PCl_5}{1} \cdot \frac{1 \text{ mol } PCl_5}{208.239 \text{ g } PCl_5} \cdot \frac{6.02\,E23 \text{ molecule } PCl_5}{1 \text{ mol } PCl_5} = \boxed{3.15\,E44 \text{ molecule } PCl_5}$$

11. How many grams of pure mercury are in 2.54 X 10^{23} atoms of mercury?

$$\frac{2.54\,E23 \text{ atoms Hg}}{1} \cdot \frac{1 \text{ mol Hg}}{6.02\,E23 \text{ atoms Hg}} \cdot \frac{200.59 \text{ g Hg}}{1 \text{ mol Hg}} = \boxed{84.6 \text{ g Hg}}$$

12. How many formula units (f.u.) of copper (II) sulfate are in 1.43 grams of copper (II) sulfate?

$$\frac{1.43 \text{ g } CuSO_4}{1} \cdot \frac{1 \text{ mol } CuSO_4}{159.602 \text{ g } CuSO_4} \cdot \frac{6.02\,E23 \text{ fu } CuSO_4}{1 \text{ mol } CuSO_4} = \boxed{5.39\,E21 \text{ fu } CuSO_4}$$