

Do these problems on a separate piece of paper. Show all of your work.

**Remember sigfigs! And Units!**

- Calculate the molar mass of each of the following compounds.
  - $K_2SO_4$
  - $H_3PO_4$
  - $NH_4Cl$
  - $Na_3PO_4$
  - $Ni(CN)_2$
  - $KH_2PO_4$
  - iron (II) sulphate
  - iron (III) sulphate
  - copper (I) carbonate
  - copper (II) carbonate
  - dinitrogen trioxide
  - aluminum sulphate
- What is the mass of one mole of each of the following compounds?
  - AgCl
  - MgCrO<sub>4</sub>
  - chromium (IV) oxide
  - carbon tetrachloride
- Determine the number of moles in:
  - 29.3 g of Cu
  - 1.25 kg of Pb
  - 155 g of P<sub>2</sub>O<sub>5</sub>
  - 109.2 g of Al
  - 345 mg of Hg
  - 783 mg O<sub>2</sub>
- How many grams are there in:
  - 2.667 moles of Zn
  - $2.31 \times 10^3$  moles of Li
  - 5.83 moles of Cr<sub>2</sub>O<sub>3</sub>
  - 0.298 moles of Au
  - 34.6 moles of Fe
  - 872 moles of O<sub>2</sub>
- How many atoms are there in:
  - 4.32 moles of Ag
  - $5.12 \times 10^{-8}$  moles of Co
  - 23.4 moles of Zn<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>
  - 0.276 moles of Na
  - 9.87 moles of K
  - $1.452 \times 10^{12}$  moles of O<sub>2</sub>
- How many:
  - atoms of Cl in 23.4 g of CCl<sub>4</sub>
  - g of N in  $5.57 \times 10^{23}$  molecules of N<sub>2</sub>O<sub>4</sub>
  - g of H in 1 molecule of H<sub>2</sub>
  - moles of aluminum sulphide in 228.9 g of aluminum sulphide
  - molecules of CO<sub>2</sub> in a sample of CO<sub>2</sub> that contains 12.4 g of O
- If a computer can do  $1.00 \times 10^6$  calculations in 1.00 s, how many years will it take one billion computers to do 1.00 moles of calculations? 1 year = 365.25 days
- If you had one mole of pennies to divide among all the people in the world, how many dollars would each person receive? Use 5 thousand million as the population of the earth. (use 3 sigfigs for your answer)
- The most delicate balance can detect a mass of about  $10^{-8}$  g. How many gold atoms would be in a sample having this mass? (use 3 sigfigs for your answer)
- How many moles of iron (III) chloride could be made with  $1.81 \times 10^{23}$  atoms of chlorine and the appropriate number of iron atoms?

Answers: Remember, you must show all of your work. These answers are here to ensure you are doing the work correctly!

1. Calculate the molar mass of each of the following compounds?

- |           |           |           |
|-----------|-----------|-----------|
| a. 174.3g | e. 110.7g | i. 187.0g |
| b. 98.0g  | f. 136.1g | j. 123.5g |
| c. 53.5g  | g. 151.9g | k. 76.0g  |
| d. 164.0g | h. 399.9g | l. 342.3g |

2. What is the mass of one mole of each of the following compounds?

- |           |           |
|-----------|-----------|
| a. 143.4g | c. 84.0g  |
| b. 140.3g | d. 154.0g |

3. Determine the number of moles in:

- |                      |                     |
|----------------------|---------------------|
| a. 0.461 mol Cu      | d. 4.04 mol Al      |
| b. 6.03 mol Pb       | e. 0.00172 mol Hg   |
| c. 1.09 mol $P_2O_5$ | f. 0.0245 mol $O_2$ |

4. How many grams are there in:

- |                            |                               |
|----------------------------|-------------------------------|
| a. 174.4g Zn               | d. 58.7g Au                   |
| b. $1.59 \times 10^4$ g Li | e. 1930g Fe                   |
| c. 886g $Cr_2O_3$          | f. $2.79 \times 10^4$ g $O_2$ |

5. How many atoms are there in:

- |                                   |                                   |
|-----------------------------------|-----------------------------------|
| a. $2.60 \times 10^{24}$ atoms Ag | d. $1.66 \times 10^{23}$ atoms Na |
| b. $3.08 \times 10^{16}$ atoms Co | e. $5.94 \times 10^{24}$ atoms K  |
| c. $1.83 \times 10^{26}$ atoms    | f. $1.749 \times 10^{36}$ atoms O |

6. How many:

- $3.66 \times 10^{23}$  atoms Cl
- 25.9g N
- $3 \times 10^{-24}$ g H
- 1.522 mol  $Al_2S_3$
- $2.33 \times 10^{23}$  molecules  $CO_2$

7. 19.1 years

8.  $\$1.20 \times 10^{12}$ /person

9.  $3.06 \times 10^{13}$  atoms Au

10. 0.100 mol  $FeCl_3$