

## Chapter 2: Atoms and Atomic Molar Mass Worksheet and Key

1. Complete the following table:

Symbol	Symbol-Mass Number	Atomic #	Mass #	# protons	# neutrons	# electrons
${}^7_3\text{Li}$						
	Mo-96					
				49	53	
			72			35
${}^{238}_{92}\text{U}$						

Answer the following questions. **Be sure to write units with every number and to use the correct number of significant figures.** Use two digits to the right of the decimal place for molar masses when possible, then your final answer will match the key exactly.

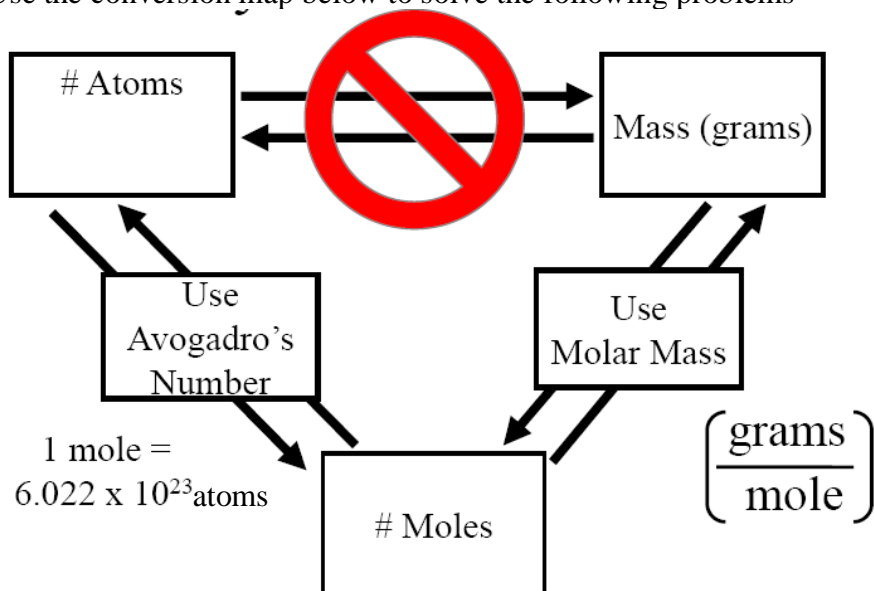
1. What is the molar mass of the following elements?

a) B \_\_\_\_\_      b) Zn \_\_\_\_\_      c) He \_\_\_\_\_

2. What is the mass (grams) of one mole of Xenon? \_\_\_\_\_

3. How many atoms are in one mole of Xenon? \_\_\_\_\_

Use the conversion map below to solve the following problems



4. How many moles of oxygen (O) contain  $1.65 \times 10^{27}$  oxygen atoms?

$$\frac{1.65 \times 10^{27} \text{ O atoms}}{\text{_____ O atoms}} \left| \frac{\text{_____ mole O}}{\text{_____ mole O}} \right| = \text{_____ mole O}$$

5. How many moles of K contain  $3.50 \times 10^{19}$  K atoms?

$$\frac{3.50 \times 10^{19} \text{ K atoms}}{\text{_____ K atoms}} \left| \frac{\text{_____ mole K}}{\text{_____ mole K}} \right| = \text{_____ mole K}$$

6. How many moles of fluorine (F) contain  $8.27 \times 10^{24}$  F atoms?

$$\frac{\text{_____ F atoms}}{\text{_____ F atoms}} \left| \frac{\text{_____ mole F}}{\text{_____ mole F}} \right| = \text{_____ mole F}$$

7. How many carbon atoms are contained in 5.45 moles of carbon?

$$\frac{5.45 \text{ moles C}}{\text{_____ mole C}} \left| \frac{\text{_____ C atoms}}{\text{_____ mole C}} \right| = \text{_____ C atoms}$$

8. How many Neon (Ne) atoms are contained in 0.75 moles of Ne?

$$\frac{\text{_____ Ne atoms}}{\text{_____ Ne atoms}} \left| \frac{\text{_____ mole Ne}}{\text{_____ mole Ne}} \right| = \text{_____ Ne atoms}$$

9. How many moles of oxygen (O) is contained 2.65 grams of oxygen?

$$\frac{2.65 \text{ g O}}{\text{_____ g O}} \left| \frac{\text{_____ 1 mole O}}{\text{_____ g O}} \right| = \text{_____ mole O}$$

10. How many moles of potassium (K) is contained 8.44 grams of potassium?

$$\frac{8.44 \text{ g K}}{\text{_____ g K}} \left| \frac{\text{_____ mole K}}{\text{_____ mole K}} \right| = \text{_____ mole K}$$

11. How many g of Xe is contained in 0.054 moles of Xe?

$$\frac{0.054 \text{ moles Xe}}{\text{_____ mole Xe}} \left| \frac{\text{_____ g Xe}}{\text{_____ mole Xe}} \right| = \text{_____ g Xe}$$

12. How many g of C is contained in 39.5 moles of C?

$$\frac{\quad}{\quad} = \quad$$

13. What is the mass (grams) of  $5.00 \times 10^{24}$  oxygen atoms?

$$\frac{5.00 \times 10^{24} \text{ atoms O} \mid \quad \text{mole O}}{\quad \text{atoms O} \mid \quad \text{mole O}} = \quad \text{g O}$$

14. What is the mass (grams) of  $1.00 \times 10^6$  sodium (Na) atoms?

$$\frac{1.00 \times 10^6 \text{ Na atoms} \mid \quad \quad \quad}{\quad \quad \quad} = \quad \text{g Na}$$

15. How many iron atoms are in 10.0 grams of iron (Fe) ?

$$\frac{10.0 \text{ g Fe} \mid \quad \text{mole Fe} \mid \quad \text{Fe atoms}}{\quad \text{g Fe} \mid \quad \text{mole Fe}} = \quad \text{Fe atoms}$$

16. How many copper (Cu) atoms are in a 257 gram copper pipe?

$$\frac{\quad \quad \quad \mid \quad \quad \quad}{\quad \quad \quad} = \quad \text{Cu atoms}$$

See next page for KEY

# KEY

1. Complete the following table:

Symbol	Symbol- Mass Number	Atomic #	Mass #	# protons	# neutrons	# electrons
${}^7_3\text{Li}$	Li-7	3	7	3	4	3
${}^{96}_{42}\text{Mo}$	Mo-96	42	96	42	54	42
${}^{102}_{49}\text{In}$	In-102	49	102	49	53	49
${}^{72}_{35}\text{Br}$	Br-72	35	72	35	37	35
${}^{238}_{92}\text{U}$	U-238	92	238	92	146	92

Answer the following questions. *Be sure to write units with every number and to use the correct number of significant figures.* Use **two digits to the right of the decimal place for molar masses when possible**, then your final answer will match the key exactly.

1. What is the molar mass of the following elements?

a) B **10.81g/mole**

b) Zn **65.39 g/mole**

c) He **4.00 g/mole**

2. What is the mass (grams) of one mole of Xenon? 131.29 g

3. How many atoms are in one mole of Xenon?  $6.022 \times 10^{23}$

4. How many moles of oxygen (O) contain  $1.65 \times 10^{27}$  oxygen atoms?

$$\frac{1.65 \times 10^{27} \text{ O atoms}}{6.022 \times 10^{23} \text{ O atoms}} \left| \frac{1 \text{ mole O}}{6.022 \times 10^{23} \text{ O atoms}} \right| = 2740 \text{ mole O } \underline{\text{or}} \text{ } 2.74 \times 10^3 \text{ mole O}$$

Note: 3 significant figures!!!

5. How many moles of K contain  $3.50 \times 10^{19}$  K atoms?

$$\frac{3.50 \times 10^{19} \text{ K atoms}}{6.022 \times 10^{23} \text{ K atoms}} \left| \frac{1 \text{ mole K}}{6.022 \times 10^{23} \text{ K atoms}} \right| = 5.81 \times 10^{-5} \text{ mole K}$$

6. How many moles of fluorine (F) contain  $8.27 \times 10^{24}$  F atoms?

$$\frac{8.27 \times 10^{24} \text{ F atoms}}{6.022 \times 10^{23} \text{ F atoms}} \left| \frac{1 \text{ mole F}}{6.022 \times 10^{23} \text{ F atoms}} \right| = 13.7 \text{ mole F}$$

7. How many carbon atoms are contained in 5.45 moles of carbon?

$$\frac{5.45 \text{ moles C} \quad \left| \quad \frac{6.022 \times 10^{23} \text{ C atoms}}{1 \text{ mole C}} \quad \right|}{\quad} = 3.28 \times 10^{24} \text{ C atoms}$$

8. How many Neon (Ne) atoms are contained in 0.75 moles of Ne?

$$\frac{0.75 \text{ moles Ne} \quad \left| \quad \frac{6.022 \times 10^{23} \text{ Ne atoms}}{1 \text{ mole Ne}} \quad \right|}{\quad} = 4.5 \times 10^{23} \text{ Ne atoms}$$

9. How many moles of oxygen (O) is contained 2.65 grams of oxygen?

$$\frac{2.65 \text{ g O} \quad \left| \quad \frac{1 \text{ mole O}}{16.00 \text{ g O}} \quad \right|}{\quad} = 0.166 \text{ mole O}$$

Molar Mass of Oxygen  
1 mole O = 16.00 grams O

10. How many moles of potassium (K) is contained 8.44 grams of potassium?

$$\frac{8.44 \text{ g K} \quad \left| \quad \frac{1 \text{ mole K}}{39.10 \text{ g K}} \quad \right|}{\quad} = 0.216 \text{ mole K}$$

11. How many g of Xe is contained in 0.054 moles of Xe?

$$\frac{0.054 \text{ moles Xe} \quad \left| \quad \frac{131.29 \text{ g Xe}}{1 \text{ mole Xe}} \quad \right|}{\quad} = 7.1 \text{ g Xe (NOTE: 2 significant figures)}$$

12. How many g of C is contained in 39.5 moles of C?

$$\frac{39.5 \text{ mole C} \quad \left| \quad \frac{12.01 \text{ g C}}{1 \text{ mole C}} \quad \right|}{\quad} = 474 \text{ g C}$$

13. What is the mass (grams) of  $5.00 \times 10^{24}$  oxygen atoms?

$$\frac{5.00 \times 10^{24} \text{ atoms O} \quad \left| \quad \frac{1 \text{ mole O}}{6.022 \times 10^{23} \text{ O atoms}} \quad \left| \quad \frac{16.00 \text{ g O}}{1 \text{ mole O}} \quad \right| \right|}{\quad} = 133 \text{ g O}$$

14. What is the mass (grams) of  $1.00 \times 10^6$  sodium (Na) atoms?

$1.00 \times 10^6$ Na atoms	1 mole Na	22.99 g Na	= $3.82 \times 10^{-17}$ g Na
	$6.022 \times 10^{23}$ Na atoms	1 mole Na	

15. How many iron atoms are in 10.0 grams of iron (Fe) ?

10.0 g Fe	1 mole Fe	$6.022 \times 10^{23}$ Fe atoms	= $1.08 \times 10^{23}$ Fe atoms
	55.85 g Fe	1 mole Fe	

16. How many copper (Cu) atoms are in a 257 gram copper pipe?

257 g Cu	1 mole Cu	$6.022 \times 10^{23}$ Cu atoms	= $2.44 \times 10^{24}$ Cu atoms
	63.55 g Cu	1 mole Cu	