

U3-LM2B-WS Molar Mass and ConversionsName: _____ **KEY** _____

1. The molar mass of chlorine is:

$$2 \times 35.45 \text{ g/mol Cl} = 70.90 \text{ g/mol Cl}_2$$

(Remember that chlorine exists as a diatomic molecule in nature)

2. The molar mass of carbon dioxide is:

$$12.01 \text{ g/mol C} + (2 \times 16.00 \text{ g/mol O}) = 44.01 \text{ g/mol CO}_2$$

3. The molar mass of aluminum carbonate, $\text{Al}_2(\text{CO}_3)_3$, is:

$$(2 \times 26.98 \text{ g/mol Al}) + (3 \times 12.01 \text{ g/mol C}) + (9 \times 16 \text{ g/mol O}) = 234.0 \text{ g/mol Al}_2(\text{CO}_3)_3$$

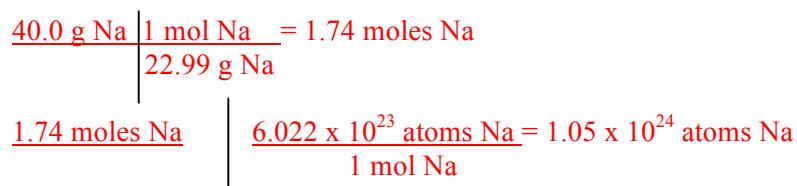
4. The molar mass of ascorbic acid (Vitamin C), $\text{C}_6\text{H}_8\text{O}_6$ is:

$$(6 \times 12.01 \text{ g/mol C}) + (8 \times 1.01 \text{ g/mol H}) + (6 \times 16 \text{ g/mol O}) = 176.14 \text{ g/mol C}_6\text{H}_8\text{O}_6$$

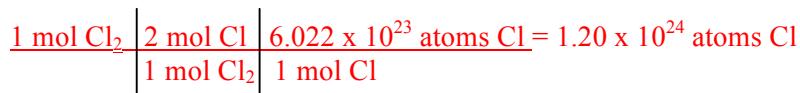
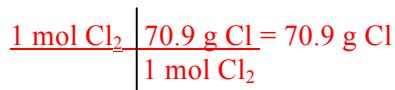
5. A 4.0g/mol represents the molar mass of the element helium.

6. A 2.0 g/mol represents the molar mass of the element hydrogen.

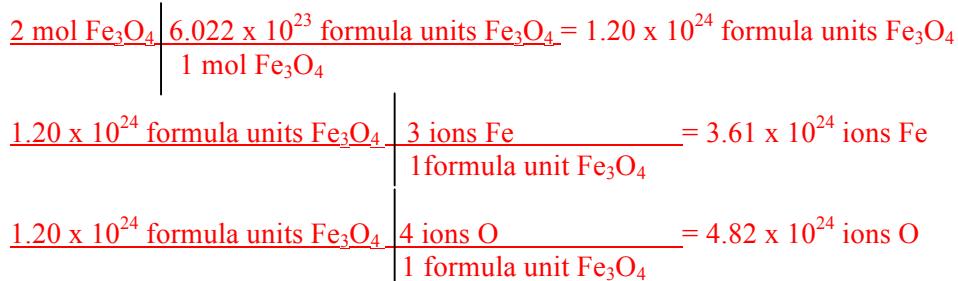
7. A 40.0 g sample of sodium is 1.74 moles of sodium and 1.05×10^{24} atoms of sodium.



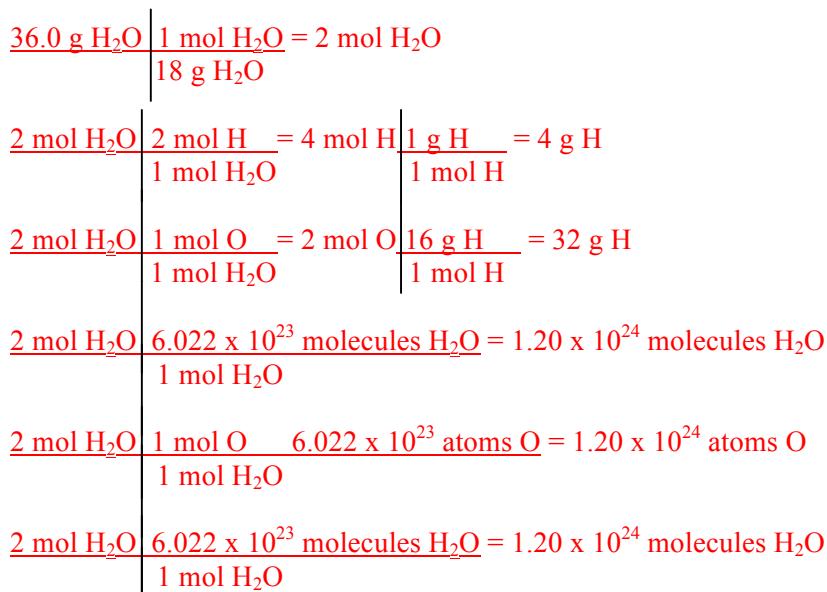
8. One mole of elemental diatomic chlorine is 70.9 grams of chlorine and contains 1.20×10^{24} atoms of chlorine.



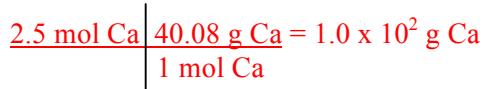
9. If 2 moles of magnetite, Fe_3O_4 , are needed, one needs to weigh 463.1 grams of the substance. This amount corresponds to two formula units and it contains 3.61×10^{24} ions of iron and 4.82×10^{24} ions of oxygen.



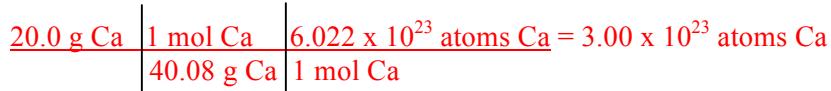
10. A sample that is 36.0 grams of water represents 2 moles of water. It contains 4 grams of hydrogen and 32 grams of oxygen. It also contains 4 moles of H atom and 2 moles of O atoms. This sample also represents 1.20×10^{24} molecules of water, 2.41×10^{24} atoms of hydrogen and 1.20×10^{24} atoms of oxygen.



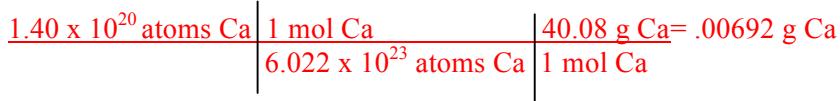
11. a-Calculate the mass in grams of 2.5 moles of calcium.



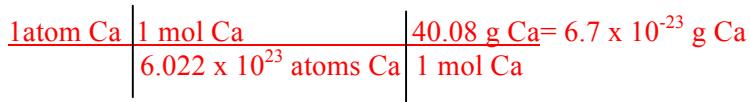
b-How many atoms are there in 20.0 grams of calcium?



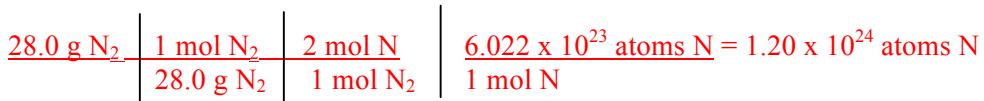
c-What is the mass of 1.40×10^{20} atoms of calcium?



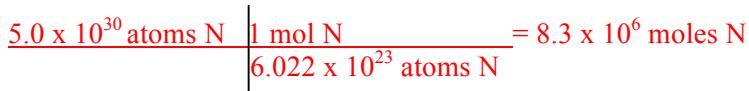
d-Calculate the mass in grams of one calcium atom.



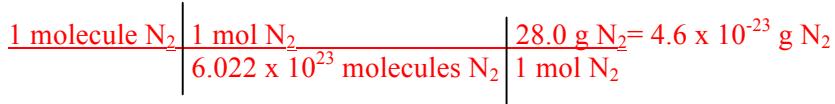
12. a-How many atoms are contained in 28.0 grams of nitrogen?



b-How many moles of N atoms are represented in 5.0×10^{30} atoms of nitrogen?



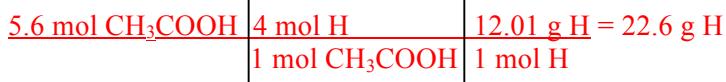
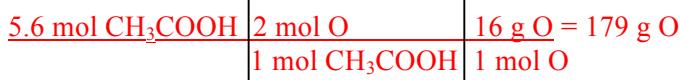
c-Calculate the mass in grams of one molecule of nitrogen.



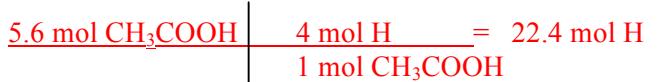
d-Calculate the mass in grams of one atom of nitrogen.



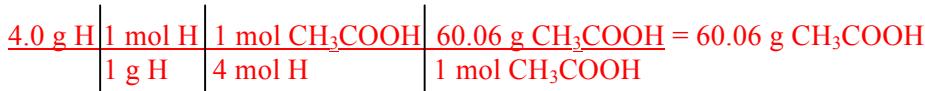
13. a-What masses of each element are presented in 5.60 moles of acetic acid, CH₃COOH?



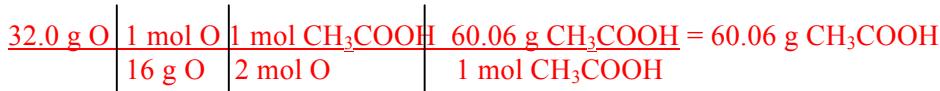
b- How many moles of H atoms and how many atoms of H does the above sample contain?



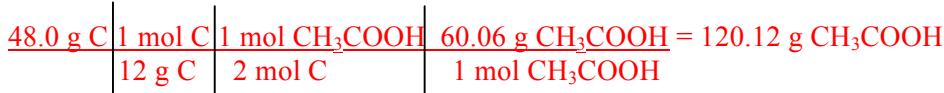
c-What is the mass of acetic acid that contains 4.0 g of hydrogen?



d-What is mass of acetic acid that contains 32.0 g of oxygen?

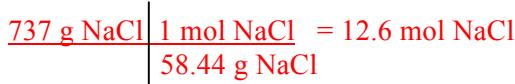


e-What mass of acetic acid contains 48.0 grams of carbon?

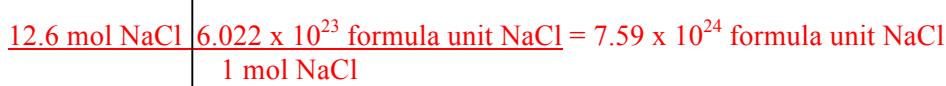


14. There are 737 g of sodium chloride in a can of salt.

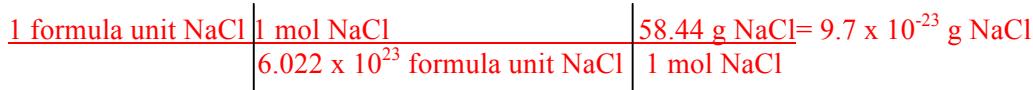
a-How many moles of sodium chloride does the can of salt contain?



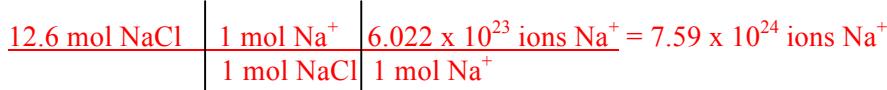
b-How many formula units of salt does the can of salt contain?



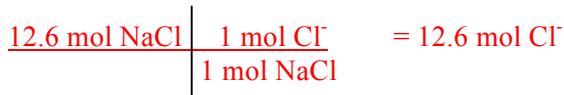
c-Calculate the mass in grams of one formula unit of sodium chloride.



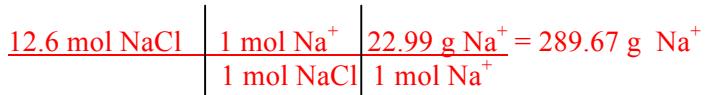
d-How many ions of sodium does the can of salt contain?



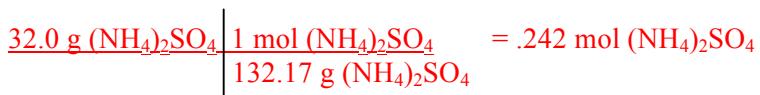
e-How many moles of chloride ions does the can contain?



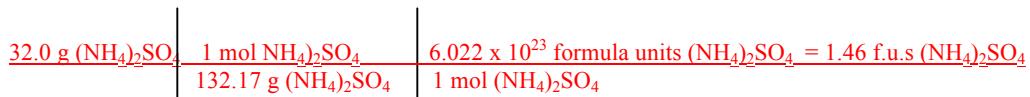
f-How many grams of sodium does the can of salt contain?



15. a-How many moles of ammonium sulfate are in 32.0 g of ammonium sulfate?

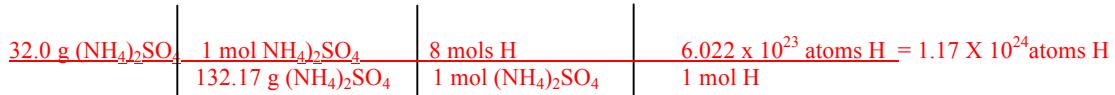


b-How many formula units of ammonium sulfate are there in 32.0 g of ammonium sulfate?



* f.u = formula unit

c-How many atoms of H are found in 32.0 g of ammonium sulfate?



d-How many grams of hydrogen are found in 32.0 g of ammonium sulfate?

