SAMPLE CALCULATIONS for STP and RTP:

1. How many moles of ozone occupy a volume of 3.36 L at STP?
2. What is the mass of 575 L of ammonia gas at RTP?
3. What is the volume occupied by 0.125 g of H_2S gas at STP?
4. What mass of carbon dioxide occupies a volume of 1.05 L at RTP?
5. How many oxygen atoms are present in 0.12 L of nitrogen dioxide gas at STP?
6. What is the density of chlorine gas at RTP?
7. What is the density of acetylene gas (C_2H_2) at 0^oC and 760 mmHg?
8. Identify the gaseous element with a density of 1.63 g/L at RTP.
9. Calculate the number of carbon atoms in 35 L of C_3H_8 (propane) gas at RTP.
10. What if question 9 asked for sodium bicarbonate instead of C_3H_8? Would the question be done differently if it was an ionic "compound" versus a covalent molecule?
11. What volume will 5.25×10^{22} molecules of methane occupy at STP?
12. Gold has a density of 19.30 g/mL. If your brick of gold occupies a volume of 645 cm^3, how many atoms of gold are in your brick? Keep in mind that $1cm^3 = 1mL$.
13. The density of oxygen gas at STP is 1.43 g/L. If you have 7.8 g of the gas, how many molecules of oxygen gas are in your sample?
14. A sealed container holds 5.0 L of a gas. The gas has a mass of 6.25g. What is the molar mass of this gas at STP?

Supplementary Mole Calculations Exercise

1) How many molecules are there in 240 grams of FeF_3?
2) How many grams are there in 7.40×10^{23} molecules of $AgNO_3$?
3) How many grams are there in 9.4×10^{25} molecules of hydrogen gas?
4) How many moles of iodine atoms are there in 3.025×10^{24} molecules of N_2I_6?
5) How many grams of O are there in 1.00×10^{24} molecules of phosphoric acid?
6) How many atoms of Cl are there in 9.3 grams of $BeCl_2$?
7) What mass of $SO_2(g)$ would occupy a volume of 225 L at RTP?
8) How many molecules of CO(g) are there in 75.0 L of the gas at STP?
9) What is the density of $SiH_4(g)$ at RTP?
10) A gas has a density of 3.56 g/L at STP. What is its molar mass?

SAMPLE CALCULATIONS for STP and RTP ANSWER KEY

Watch your sig figs!

1) 0.150 mol (mol is the short form for mole or moles) ☺
2) 399 g
3) 0.0821 L
4) 1.89 g
5) 6.45×10^{21} O atoms
6) 2.90 g/L
7) 1.16 g/L
8) 39.9 g / mole which is ARGON gas
9) 2.6×10^{24} C atoms
10) No, the question would not be done differently. You calculate the number of atoms in the same regardless of an ionic compound or covalent molecule.
atoms / ionic cpd OR # atoms / covalent molecule
11) 1.95 L
12) 3.80×10^{25} Au atoms
13) 1.5×10^{23} molecules
14) 28 g/ mole which would be N_2 gas!

Supplementary Mole Calculations Exercise ANSWER KEY

1) 1.3×10^{24} molecules
2) 209 g
3) 320 g
4) 30.1 moles
5) 79.7 g
6) 1.4×10^{23} Cl atoms
7) 589 g
8) 2.02×10^{24} molecules of CO
9) 1.31 g/L
10) 79.7 g / mol