SCH 3U

**Final Exam: Some extra practice calculations**

1. Calculate the mass of 0.50 mol of sulfur. ***(Ans: 16 g)***
2. Determine the number of moles in 10.0 g of iron. ***(Ans: 0.179 mol)***
3. Calculate the mass of 1.2 x 1023 atoms of aluminum. ***(Ans: 5.4 g)***

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1. Determine the number of atoms in 2.30 g of sodium. ***(Ans: 6.02 x 1022 atoms)***
2. Determine the number of molecules of water in an ice cube with a mass of 12.6 g. ***(Ans: 4.21 x 1023 molecules)***
3. Determine the percent composition by mass of table sugar, C12H22O11. ***(Ans: %C = 42.09 %, %H = 6.49%, %O = 51.41%)***
4. A compound contains 40 % C, 6.7 % H and 53.3 % O by mass. The molecular mass of the compound is 90.1 g. Determine the molecular formula of the compound. ***(Ans: C3H6O3)***
5. Determine the number of molecules of ammonia that are produced when 43.5 g of nitrogen gas is reacted with an excess of hydrogen. ***(Ans: 1.87 x 1024 molecules)***

N2(g) + 3 H2(g) 🡪 2 NH3(g)

1. Calcium carbonate is decomposed by heating. If 20.4 g of calcium carbonate are heated, determine the following:
2. Theoretical yield of CaO ***(Ans: 11.4 g CaO)***
3. Percent yield if 10.6 g are actually produced ***(93.0%)***

CaCO3(s) 🡪 CaO(s) + CO2(g)

1. Sodium reacts with chlorine gas to form solid sodium chloride. If 4.80 mol Na react with 2.70 mol of Cl2 determine the limiting reagent and how many mols of NaCl that can be produced. ***(Ans: Na is limiting, 4.80 mol of NaCl can be produced)***

2 Na(s) + Cl2(g) 🡪 2 NaCl(s)

1. In Vancouver, a balloon with a volume of 5.0 L is filled with air at 101 kPa pressure. The balloon is then taken to Banff where the atmospheric pressure is only 91 kPa. If the temperature is the same in both areas, what will the new volume of the balloon be? ***(Ans: 5.5L)***
2. Find the volume of 1.00 g of water in the gas phase at its boiling point (100 C) at 101 kPa. The ideal gas constant is 8.31 kPa·L/mol·K. ***(Ans: 1.70 L)***