TUTORAL N°1

Activity 1:

A vitamin C500 tablet contains a mass m = 500 mg of vitamin C with the formula $C_6H_8O_6$.

1°) Calculate the molecular molar mass of vitamin C.

2°) Calculate the amount of moles of vitamin C contained in this tablet.

3°) Calculate the number of vitamin C molecules in this tablet

Activity 2 :

Some candies contain a red dye, cochineal red, which owes its name to the insects used in its production. 15,000 insects are needed to produce 0.03 mol of this dye. A package contains 30 red candies. Determine the number of insects needed to color the candies in one package.

Data: Molecular formula of cochineal red: $C_{22}H_{20}O_3$. One red candy contains approximately 1.6 mg of dye.

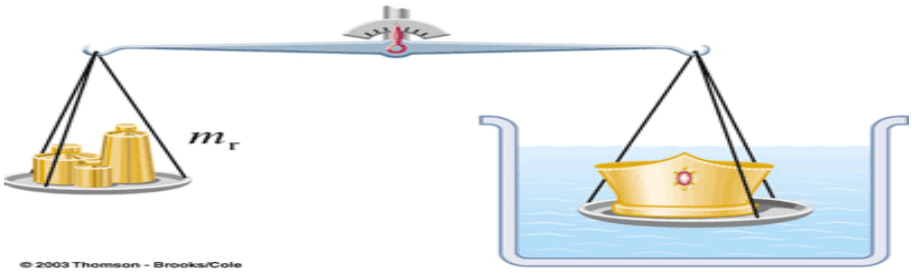
Activity 3 :

Steel is an alloy consisting mainly of carbon and iron, and there are several types of steel depending on the mass percentage of carbon in the alloy.

1. Calculate the mass of carbon in a steel tube weighing 5 kg containing 0.77% carbon.
2. Calculate the mass fraction and molar fraction of carbon in a steel tube weighing 5 kg containing 105 g of carbon.

Activity 4 :

King Hieron (ruler of Syracuse from -265 to -215) is said to have commissioned a gold crown from a goldsmith. Suspecting that the goldsmith had replaced some of the gold with silver, he reportedly asked Archimedes to verify its composition. Calculate the composition of the crown.



- Mass of the crown = 800 g
- Volume of the crown = 50 ml

ρ_{Au} =19,3g/ml, ρ_{Ag}= 10,5g/ml.

Activity 5 :

The combustion reaction of pentane can be expressed as follows:

$$C_5H_{12(l)} + O_{2(g)} \rightarrow 5\ CO_{2(g)} + 6\ H_2O_{(l)}$$

1. What mass of CO_2(g) is produced when 100.0 g of pentane is burned?
2. What mass of O_2(g) is required to produce 60.0 g of H_2O(l)?
3. What mass of C_5H_{12}(l) is required to produce 90.0 liters of CO_2(g) at STP conditions?

Activity 6 :

In 50 mL of silver nitrate solution with a concentration of 1.0 mol/L, 0.43 g of copper turnings is introduced according to the following equation:

$$\boldsymbol{Cu(s) + Ag^{+}(l) \rightarrow Cu^{2+}(l) + Ag(s)}$$

1. Balance the equation.
2. Determine the limiting reactant and the excess reactant.
3. After 10 minutes, the concentration of copper ions is found to be 0.13 mol/L. Calculate the extent of reaction and the conversion rate.
4. Provide the material balance, knowing that the copper has completely disappeared after an hour.