The tutorial answers

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▌ The tutorial answers

1. Exercise 1

1. Water is in a liquid state at atmospheric pressure, and to change to a gaseous (or solid) state all you have to do is raise the temperature above 100°C (or lower it below 0°C).

2. One kilogram (1 kg) of pure water is placed in the freezer.

a-Volume of water :

$$V = \frac{m}{\rho} \rightarrow V = \frac{1}{10^{-3}} \rightarrow V = 10^3 mL = 1L$$

b- The water turns to ice and solidifies.

c-Following this transformation: Since the mass of the body does not change, therefore the volume varies inversely proportional to the density: $\rho_{water} > \rho_{ice}$ therefore $V_{ice} > V_{eau}$

2. Exercise 2

1 . Before starting the exercise we need to know

$$n = \frac{m}{M} ; N = n.N_A$$

With : n: number of moles; N: number of atoms and N_A avogadro's number

a- In: 6 $g\ de\ Fe$:

$$n_{Fe} = \frac{6}{56} = 0{,}107\ mol \rightarrow 0{,}107{\cdot}6{,}023{\cdot}10^{23} = 6{,}444.10^{22}\ atoms$$

b- In 6 $g\ de\ C$**:**

$$n_c = \frac{6}{12} = 0{,}5\ mol \rightarrow 0{,}5{\cdot}6{,}023{\cdot}10^{23} = 3{,}011{\cdot}10^{23}\ atoms$$

c- In 6 $g\ de$ **Ag:**

$$n_{Ag} = \frac{6}{108} = 0{,}055\ mol \rightarrow 0{,}055{\cdot}6{,}023{\cdot}10^{23} = 3{,}312{\cdot}10^{22}\ atoms$$

2 . The mass in grams of :

a-1.52 mol of Cu: $m_{Cu} = n_{Cu} - M_{Cu}$ = 1.52 - 63.5 = **96, 52 g**

b-1.52mol of Na: $m_{Na} = n_{Na} - M_{Na}$ = 1.52 - 23 = **34, 96 g**

c-1.52 mol Au: $m_{Au} = n_{Au} - M_{Au}$ = 1.52 - 197 = **299, 44 g**

3 . In a sample of1.59 g of copper oxide CuO:

$$We\ have\ n_{Cu} = n_O = n_{CuO} = \frac{1{,}59}{63{,}5+16} = 0{,}02\ mol$$

N = 0.02 - 6.023 .10^{23} = **1, 204 .10^{22}** atoms of Cu and of O, and **1, 204 .10^{22}** molecules of CuO

1. **Sample 1**:

$$0.2\ mol\ Fe_2\left(SO_4\right)_3 N = 2.0.2 - 6.0^{23}.10^{23} = \mathbf{2{,}409.10^{23}}\ atoms\ of\ Iron$$

2. **Sample 2**:

$$20g\ of\ iron\ n = \frac{m}{M} = \frac{20}{56} = 0{,}357\ mol\ ; N = 0{,}357{\cdot}6{,}023{\cdot}10^{23} = \mathbf{2{,}151{\cdot}10^{23}}\ atoms\ of\ iron$$

3. **Sample 3**:

$N = 2,5 - 10^{23} \, atoms \, of \, iron \rightarrow it \, 's \, the \, sample \, 3 \, that \, contains \, the \, most \, iron \, atoms \, .$

3. Exercise 3

A-For each of the following statements, the transformation is :

The melting of ice	Physical transformation
Dissolution of table salt in water	Physical transformation
Toast a slice of bread	Chemical transformation
Cutting a sheet of cardboard	physical transformation
Melt chocolate	physical transformation
The bleaching of a pair of jeans by bleach	Chemical transformation
Sugar caramelization	Chemical transformation

B-according to the table

1. At -30°C water is in a solid state and at 120°C water is in a state of vapour.

2. At 1600°C sodium chloride is in a gaseous state and at 25°C it is in a solid state.

3. Butane is a liquid at -134°C