Fig. 1 -Coffee (1)

Koffeeco

A residue treating the environment

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Fig. 2 - Coffee beverage (2)

Introduction

Fig. 3 - Contaminated water (3)

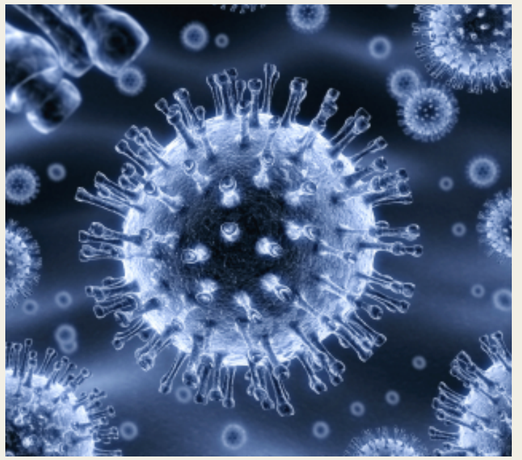


Fig. 4 - Nanoparticle (4)

Fig. 5 - Activated carbon (5)

Nanoparticles production

Top-down method

Bottom-Up method

Traditional method

Green method

Produção de Carvão Ativado

Chemical activation

Physical activation

Fig. 6 - Activated cabon's weighing (6)

Materials and methods

- Laboratory equipment (ex: beakers, volumetric flasks, funnels);
- Coffee grounds waste
- Distilled water, used to prepare every solution needed;
- Chemical reagents of analitic grade (ex: KOH e CH_3OH)
- Carbamazepine (medicine)
- Ammonium iron(iii) sulfate dodecahydrate to produce the nanoparticles
- Pyrolytic reactor

Fig. 7 - Coffee grounds waste (7)

Objectives

Fig. 8 - Coffee(8)

1.

PPREPARATION OF THE CARBAMAZEPINE SOLUTION

2.

SYNTHESIS AND CHARACTERIZATION OF GNZVI

3.

ANALYSIS OF CARBAMAZEPINE' S ADSORPTION WITH GNZVI

4.

PREPARATION OF CARBON MATERIALS

5.

ANALYSIS OF CARBAMAZEPINE' S ADSORPTION WITH ACTIVATED CARBON

Preparation of the carbamazepine solution

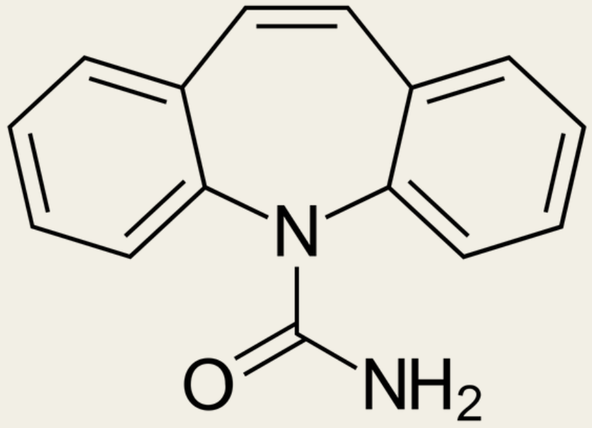


Fig. 9 - Carbamazepine's molecule (9)

$$\text{Absorbance} = 0{,}05163 * \text{Concentration} - 0{,}0113$$

$$\textit{Mass concentration of the carbamazepine solution} = 105{,}9\ mg/dm^3$$

Synthesis and characterization of gnZVI

Fig. 10 - Nanoparticles production (10)

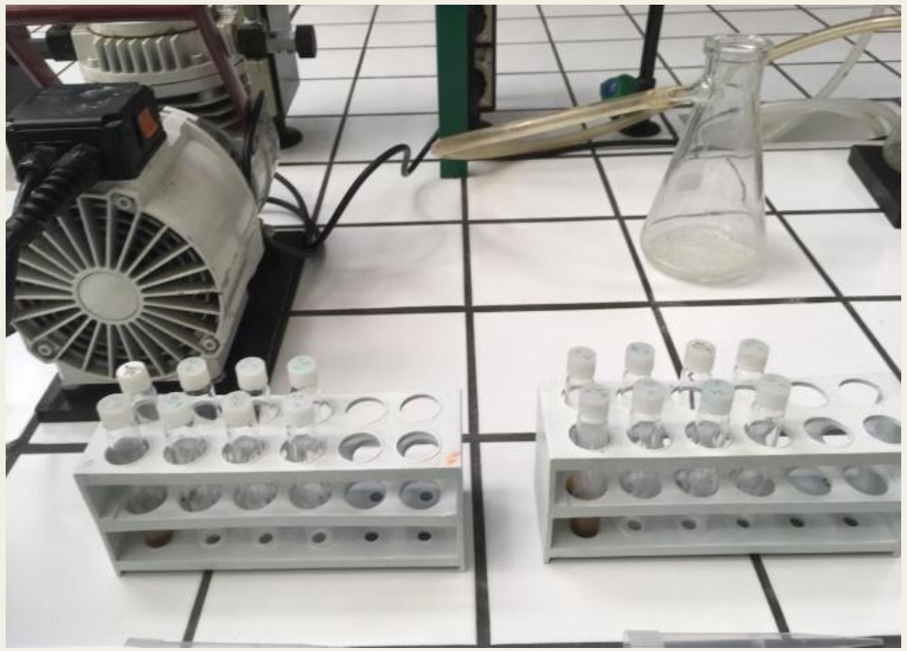


Fig. 11- Experiments with nanoparticles (11)

Analysis of carbamazepine's adsorption with gnZVI

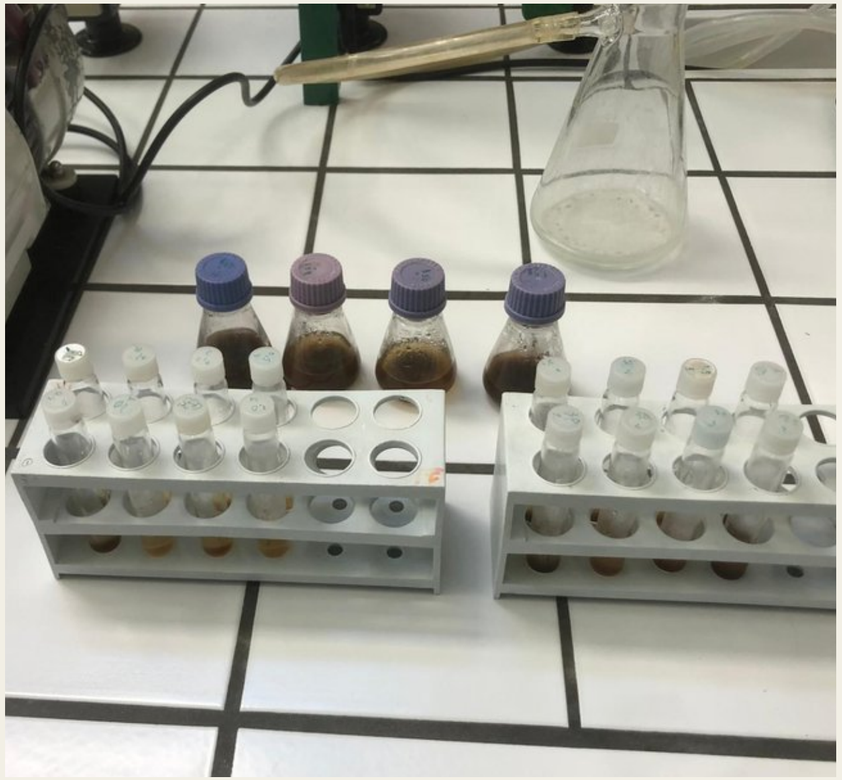
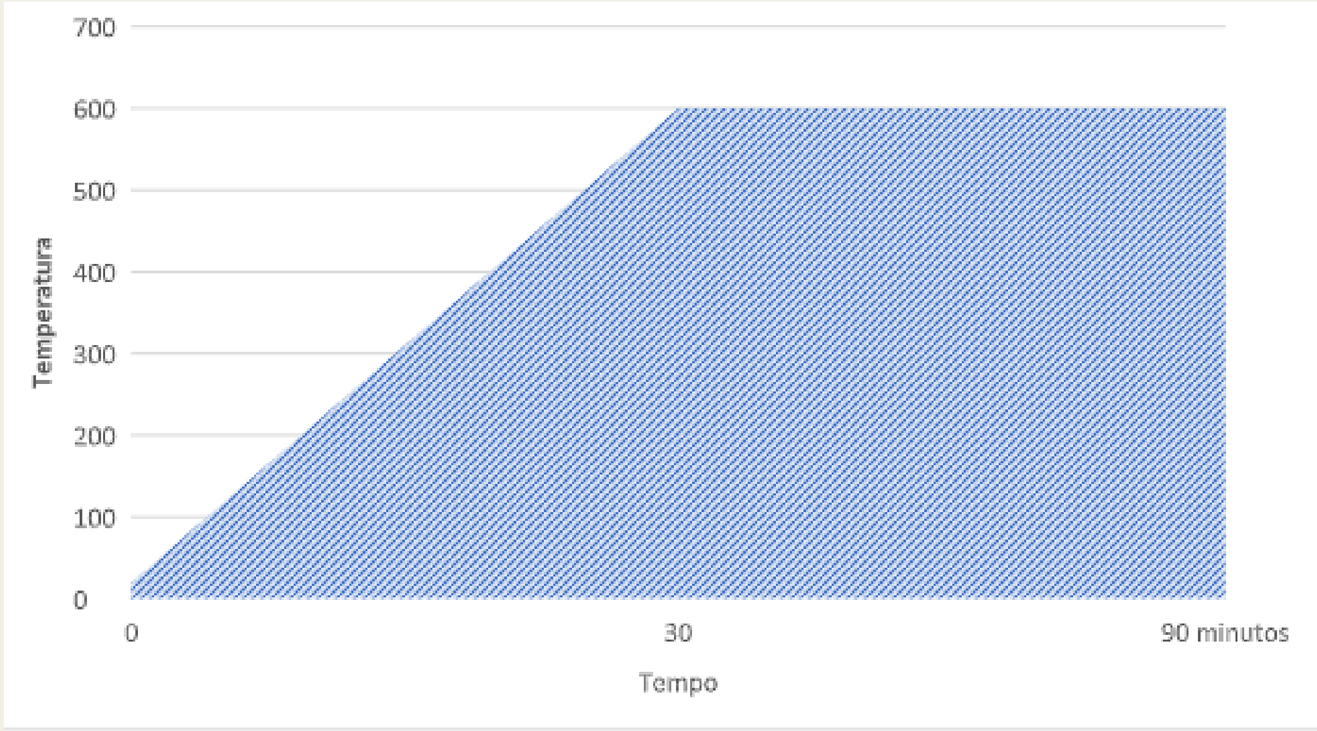


Fig. 12- Experiments with the nanoparticles and coffe grounds (12)

Fig. 13 - Trials using the spectrophotometer (13)

Preparation of carbon materials

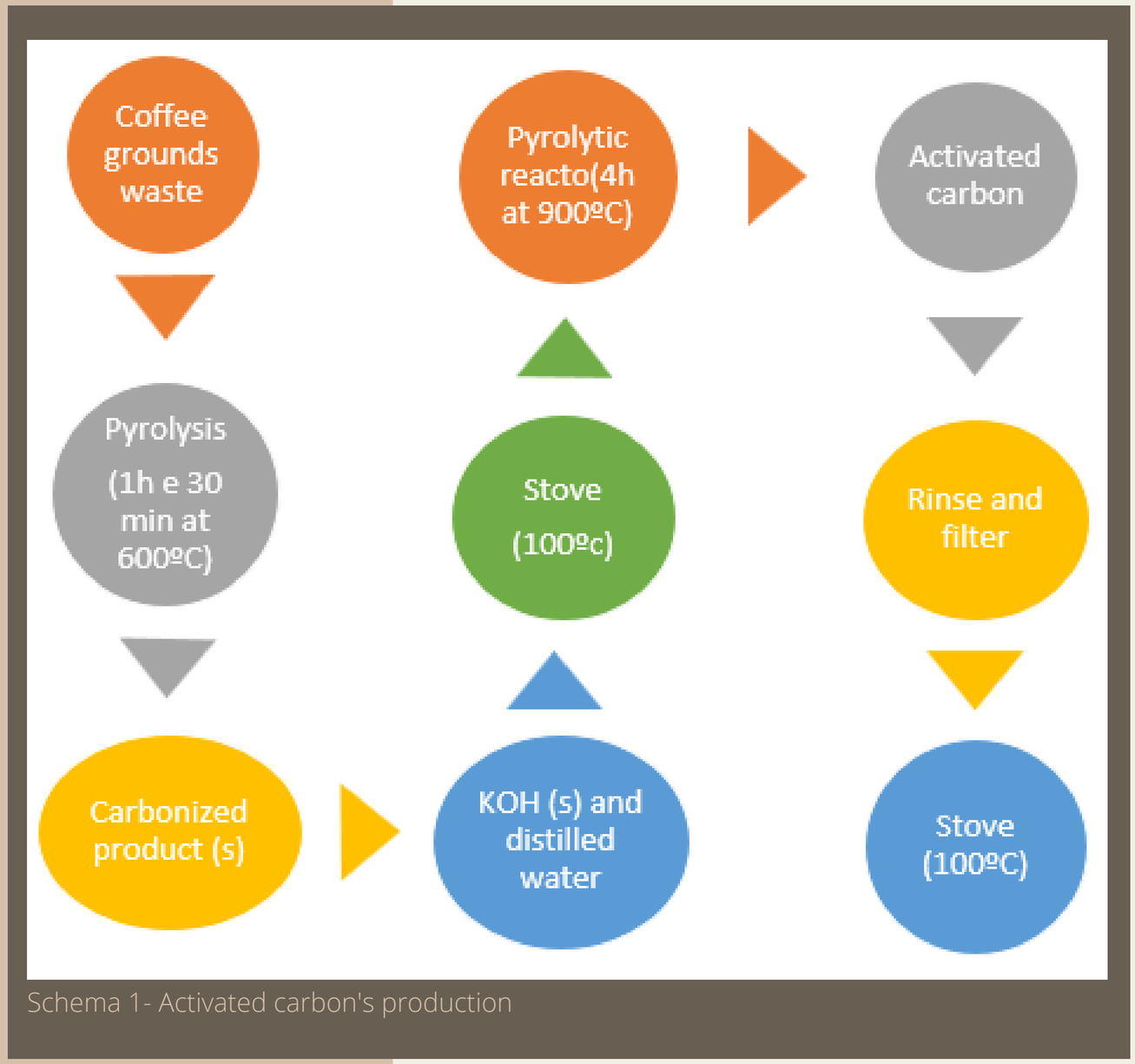
Fig. 14 - Placing the basket in the pyrolytic reator(14)



Graphic 1- heating ramp

Pyrolysis ≠ Combustion

Preparation of carbon materials



Schema 1- Activated carbon's production

M carbonized product = 28,2725 g

$$Yield_{AC}\ (\%) = \frac{Mp}{M_{CG}} * 100$$

Analysis of carbamazepine’s adsorption with activated carbon

Fig. 15- Preparation of the Carbamazepine's solution

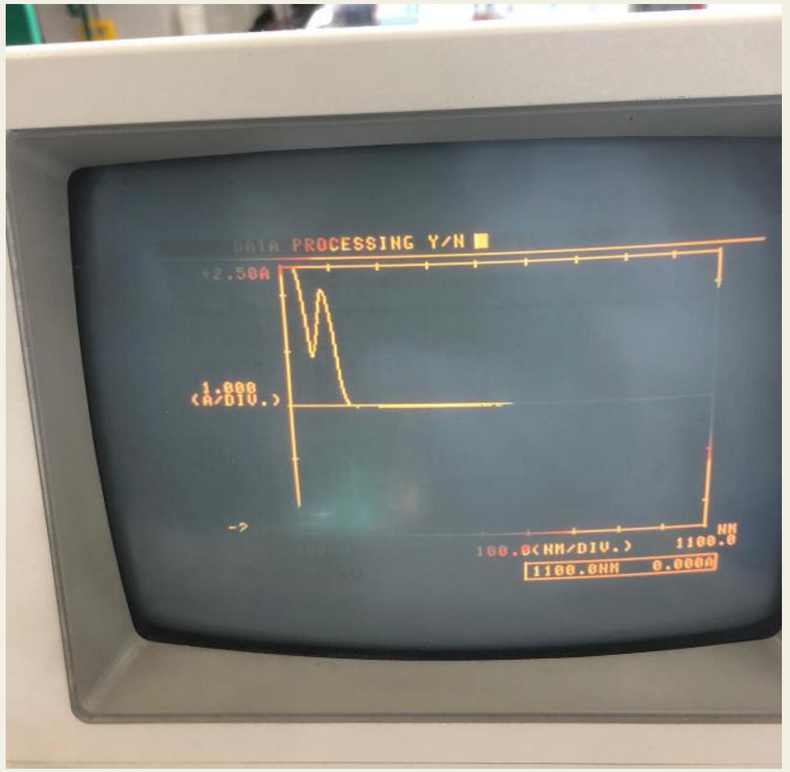
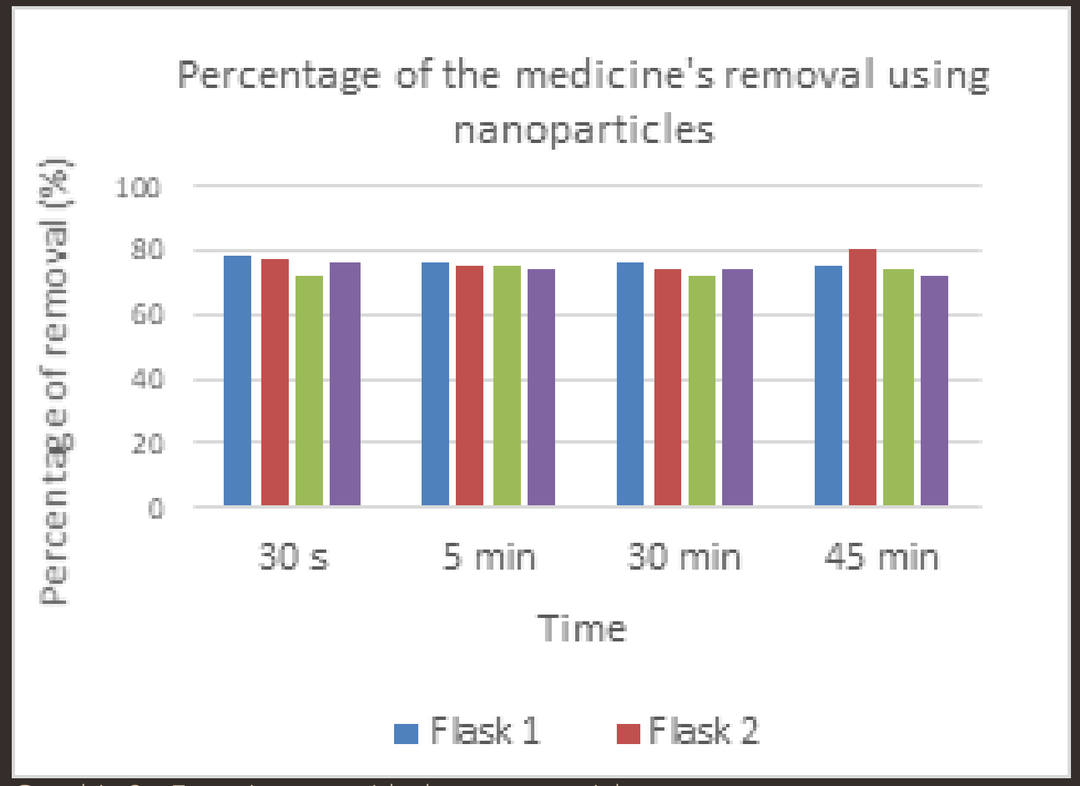


Fig. 16- Reading the absorbances in the spectrophotometer (16)

Fig. 17- Coffee (17)

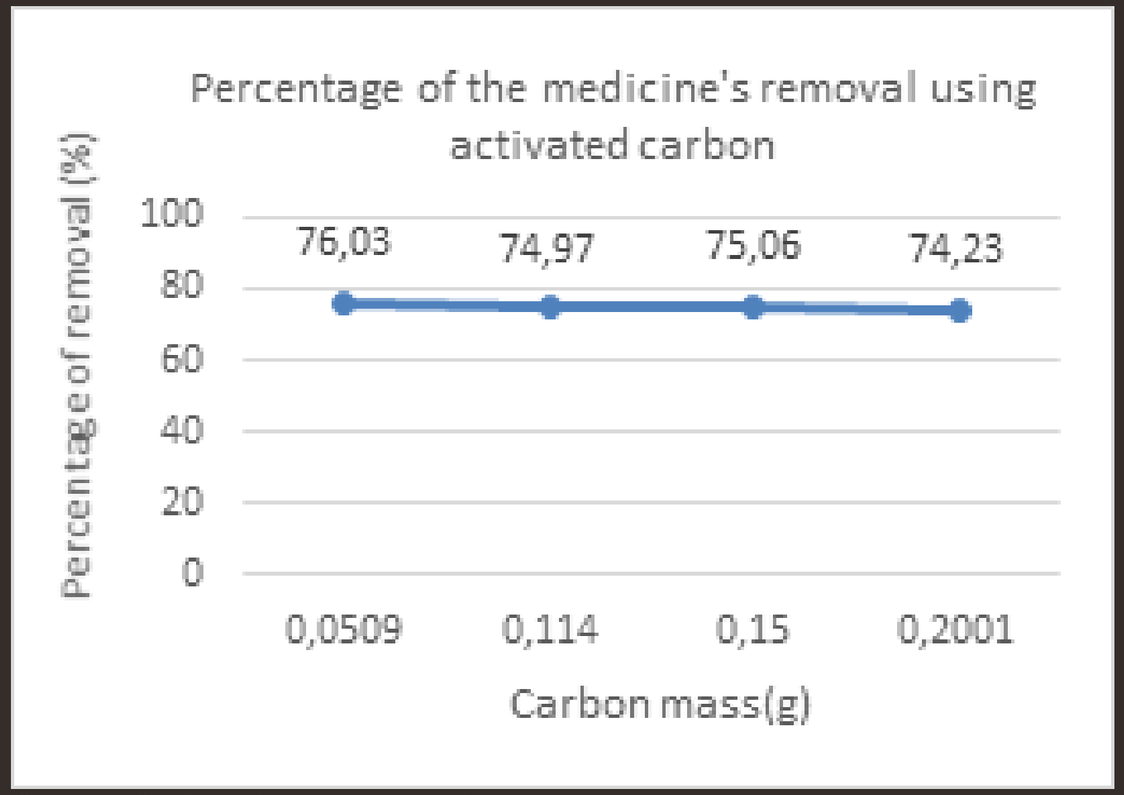
Results



Graphic 2 - Experiments with the nanoparticles

Results

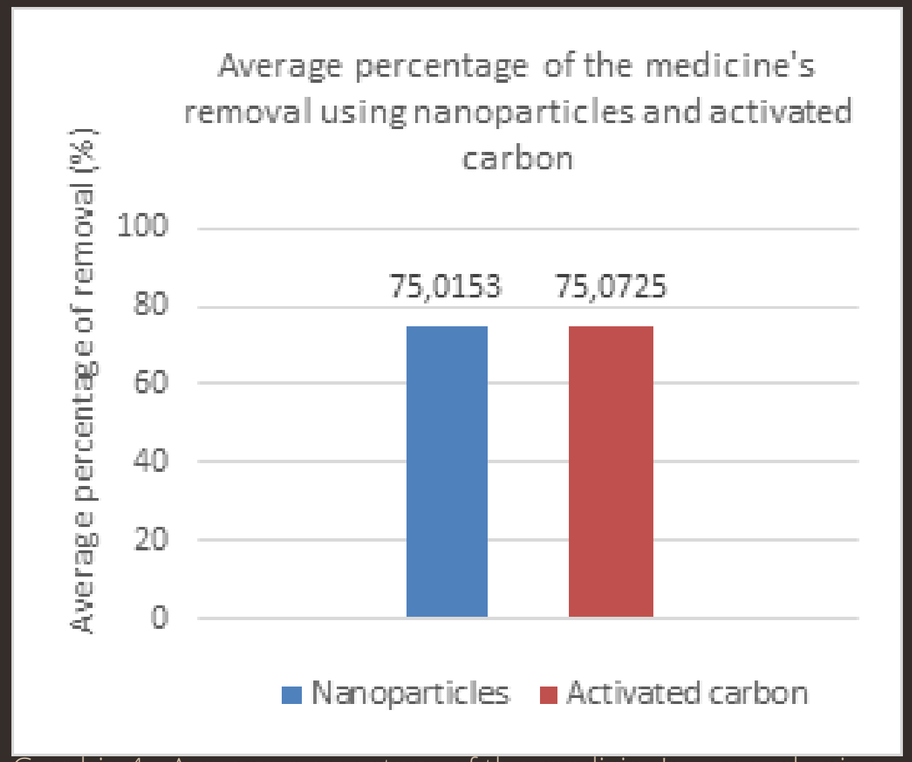
Fig. 17- Coffee (17)



Graphic 3 - Experiments with activated carbon

Results

Fig. 17- Coffee (17)



Graphic 4 - Average percentage of the medicine's removal using nanoparticles and activated carbon

Conclusion

Fig. 18- Coffee and coffee grounds waste(18)

Fig. 19- Project team19)

References

Fig. 20- Borra de café (20)

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