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Catalytic reduction and antibacterial activity of clay modified by silver nanoparticles

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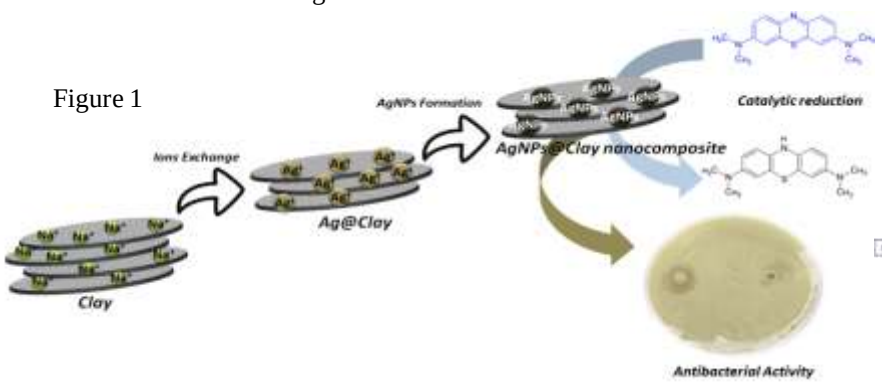
Introduction:

Organic pollutants and pathogenic microorganisms are among the main environmental pollutants, which result from the massive increase in world population and industrial activities. They are not only dangerous to human health, but also harmful to the ecosystem, these impacts have led researchers to test and evaluate other effective, environmentally friendly and low-cost materials to minimize these effects.

Objectives :

The purpose of this studyis to prepare nanocomposite materials based on silver species supported on the bentonite modified by different methods (stirring and/or sonification process) for the catalytic and the antibacterial activity (**Fig.1**). The obtained samples were tested via the catalytic reduction of methylene blue dye in the presence of $NaBH_4$ and also against different bacteria as an antibacterial agent.

Figure 1



Materials and Methods:

The physico-chemical properties of the different samples were evaluated by different analytical techniques such as XRD, FTIR, TG and UV-vis DR.

Partie expérimentale:

➢ ***Organigramme de processus de conception de notre projet***

-Préparation de Ag@MMT par le mélange MMT + $AgNO_3$

-Formation de AgNPs dans la surface de le MMT en utilisant le $NaBH_4$

-Caractérisation des matériaux Ag@MMT et AgNPs@MMT

-Préparation de la solution mère ainsi que les concentrations a étudiées

-Test antibacterial and test catalytique réduction catalytique de bleu de méthylène

➢ ***Préparation de Ag@MMT***

➢ ***Préparation de AgNPs@MMT***

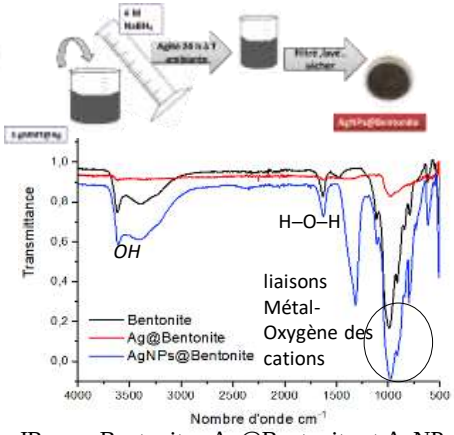


Figure 2: Spectre IR pour Bentonite , Ag@Bentonite et AgNPs@Bentonite.

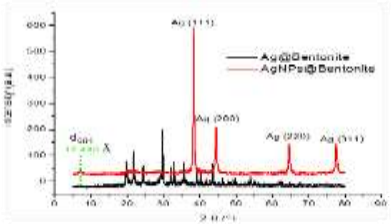


Figure 3:Spectre DRX pour Ag@Bentonite et AgNPs@Bentonite

➢ ***Application de AgNPs@MMT pour Réduction de colorant (test catalytique)***

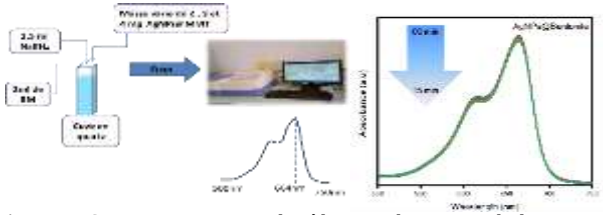


Figure .4: Spectres UV-vis pour la réduction du BM test d'adsorption d'AgNPs@Bentonite sans agent réducteur

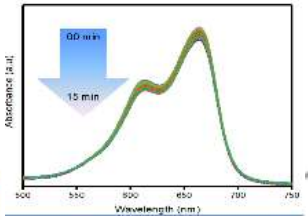
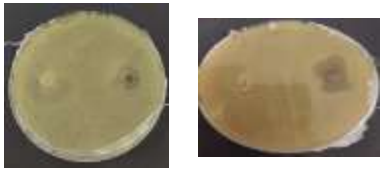


figure .5: Spectres UV-vis pou la réduction du colorant B M test à blanc sans catalyseur et en présence de NaBH4.

➢ ***Application de AgNPs@MMT pour test antibacterial***



Conclusion :

AgNPs@bentonite sample has also revealed a better efficiency at inhibiting the pathogenic bacteria and this, is due to the presence and the well dispersion of silver nanoparticle the bentonite surface