



Fabrication and Characterization of Hydroxyapatite/ Carbon Nanocomposites for Water Treatment

Presented by

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ABSTRACT

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Novel hydroxyapatite/graphene (HAp/G) and octadecylamine/hydroxyapatite/graphene (ODA/HAp/G) nanocomposites were recommended as excellent sorbents for the removal of different types of water contaminants. High-resolution transmission electron microscopy (HR-TEM), energy dispersive X-ray analysis (EDX), X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectrophotometry, Raman spectrophotometry, particle size distribution, and zeta potential measurements were performed to reveal the morphology, composition, crystal structure, functionality and stability of the prepared sorbents. Batch adsorption study was successfully employed on heavy metal ions (Pb^{2+} and Cd^{2+}), Mineral metal ions (Fe^{3+} and Mn^{2+}), organic dye (methylene blue, MB) and emulsified crude oil. The equilibrium concentrations of all contaminations were assessed according to standard methods. The kinetics of the sorption process were investigated together with the influence of the initial pollutant concentration, sorbent dosage and solution pH on the sorption capacity. The sorption process followed pseudo-second-order kinetics, and (10-30) min was quite enough to attain equilibrium. The data were correlated using four adsorption isotherm models (Freundlich, Langmuir, Temkin and Dubinin–Radushkevich) to understand the adsorption mechanism. It was found that the maximum sorption capacity (q_{max} , mg/g) for Pb^{2+} , Cd^{2+} , Fe^{3+} , Mn^{2+} , MB and emulsified crude oil were respectively 400, 370, 416, 588, 333, 714.

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LIST OF CONTENTS

CHAPTER (1): INTRODUCTION AND OBJECTIVES	1
CHAPTER (2): LITERATURE REVIEW	4
2.1. Importance of water and its scarcity:	4
2.2. Types of water-related pollutants:.....	4
2.3. Wastewater treatment techniques:	7
2.3.1. <i>Chemical precipitation:</i>	7
2.3.2. <i>Desalination</i>	8
2.3.3. <i>Photocatalytic degradation methods</i>	9
2.3.4. <i>Coagulation–flocculation:</i>	9
2.3.5. <i>Flotation:</i>	10
2.3.6. <i>Reverse osmosis:</i>	11
2.3.7. <i>Membrane filtration:</i>	12
2.3.8. <i>Nanofiltration:</i>	13
2.3.9. <i>Ion exchange:</i>	14
2.3.10. <i>Electrochemical treatment:</i>	15
2.3.11. <i>Phytoremediation:</i>	15
2.3.12. <i>Adsorption treatment and nanotechnology:</i>	16
• Sorbents of interest:	17
• Adsorption isotherms:	20
2.4. Major limitations associated with conventional water purification methods:	22
CHAPTER (3): EXPERIMENTAL WORK.....	26
3.1. Nanosorbents preparation:	26
3.1.1. <i>Preparation of HAp/G nanocomposite:</i>	26
3.1.2. <i>Preparation of ODA/HAp/G nanocomposite:</i>	28
3.1.3. <i>Materials characterization:</i>	30



3.1.4. *Transmission electron microscope imaging and energy dispersive x-ray analysis (HR-TEM & EDX):* 30

3.1.5. *X-ray diffraction (XRD):* 31

3.1.6. *Fourier transform infrared spectroscopic measurement (FTIR):*... 32

3.1.7. *Raman spectroscopic measurement:*..... 33

3.1.8. *Zeta-potential measurement:* 33

3.2. **Sorption experiment:** 34

3.2.1. *Determination of the sorption capacity:* 34

3.2.2. *Effect of contact time:* 36

3.2.3. *Effect of initial concentration:*..... 37

3.2.4. *Effect of pH and sorbent dosage:*..... 40

3.2.5. *EDX analysis for nanosorbents after adsorption process:*..... 40

CHAPTER (4):RESULTS & DISCUSSION 41

4.1. **Characterization of the optimized HAp/G and ODA/HAp/G structures:** 41

4.1.1. *Transmission electron microscope imaging and energy dispersive x-ray analysis:* 41

4.1.2. *X-ray diffraction spectroscopic measurement:*..... 48

4.1.3. *Fourier transform infrared spectroscopic measurement:* 50

4.1.4. *Raman spectroscopic measurement:*..... 53

4.1.5. *Zeta-potential measurement:* 54

4.2. **Sorption study:** 57

4.2.1. *Sorption study of toxic heavy metal ions (Pb²⁺, Cd²⁺)* 57

4.2.1.1. *Effect of contact time:*..... 57

4.2.1.2. *Effect of initial metal concentrations:*..... 60

4.2.1.3. *Effect of pH:* 68

4.2.1.4. *Effect of sorbent dosage:* 71

4.2.1.5. *EDX analysis after Pb and Cd ions adsorption on HAp/G:*..... 73

4.2.2. *Sorption study of mineral metal ions (Fe³⁺, Mn²⁺) using HAp/G.* 74

4.2.2.1. *Effect of contact time:*..... 74

4.2.2.2. *Effect of initial metal concentrations:* 78

4.2.2.3. Effect of pH:	86
4.2.2.4. Effect of sorbent dosage:	89
4.2.2.5. EDX analysis after Fe and Mn ions adsorption on HAp/G:	91
4.2.2.6. Desorption study:	92
4.2.3. <i>Effect of competing ions:</i>	92
4.2.4. <i>Sorption study of organic dye (methylene blue) using HAp/G</i>	93
4.2.4.1. Effect of contact time:.....	93
4.2.4.2. Effect of initial MB concentrations:	95
4.2.4.3. Effect of pH:	102
4.2.4.4. Effect of sorbent dosage:	104
4.2.5. <i>Sorption study of crude oil using ODA/HAp/G</i>	105
4.2.5.1. Effect of contact time:.....	105
4.2.5.2. Effect of the initial oil concentration:	108
4.2.5.3. Effect of pH:	113
4.2.5.4. Effect of sorbent dosage:	115
CHAPTER (5): CONCLUSION & FUTURE WORK.....	116
CHAPTER (6): REFERENCES	119
المخلص	129



LIST OF FIGURES

FIGURE 1: NUMBER OF SCIENTIFIC PUBLICATIONS AROUND WATER TREATMENT FROM (2008-2018), SCOPUS DATABASE.	2
FIGURE 2: A SCHEMATIC DIAGRAM FOR THE CHEMICAL PRECIPITATION TECHNIQUE.	8
FIGURE 3: A SCHEMATIC DIAGRAM FOR THE PHOTOCATALYTIC TREATMENT TECHNIQUE.	9
FIGURE 4: A SCHEMATIC DIAGRAM FOR THE COAGULATION-FLOCCULATION TECHNIQUE.	10
FIGURE 5: A SCHEMATIC DIAGRAM FOR THE FLOTATION TECHNIQUE.	11
FIGURE 6: A SCHEMATIC DIAGRAM FOR THE REVERSE OSMOSIS UNIT.	12
FIGURE 7: A SCHEMATIC DIAGRAM FOR THE MEMBRANE FILTRATION TECHNOLOGY.	13
FIGURE 8: A COMPARISON BETWEEN MICRO, ULTRA, NANOFILTRATION AND REVERSE OSMOSIS IN WATER PURIFICATION.	14
FIGURE 9: (A) MOLECULAR FORMULA STRUCTURE AND (B) UNIT CELL STRUCTURE OF HYDROXYAPATITE.	18
FIGURE 10: THE HEXAGONAL SHAPE OF CARBON ATOMS WHICH FORM THE GRAPHENE NANOSHEET.	19
FIGURE 11: GRAPHENE-BASED MICROBOTS FOR TOXIC HEAVY METAL REMOVAL AND RECOVERY FROM WATER [67].	20
FIGURE 12: A SCHEMATIC DIAGRAM OF HAP/G PREPARATION.	28
FIGURE 13: A SCHEMATIC DIAGRAM OF ODA/HAP/G PREPARATION.	29
FIGURE 14: HIGH-RESOLUTION TRANSMISSION ELECTRON MICROSCOPE.	31
FIGURE 15: X-RAY DIFFRACTION SPECTROPHOTOMETER.	32
FIGURE 16: FOURIER-TRANSFORM INFRARED SPECTROPHOTOMETER.	33
FIGURE 17: RAMAN SPECTROPHOTOMETER.	33
FIGURE 18: ZETASIZER NANO SERIES INSTRUMENT.	34
FIGURE 19: (A) ATOMIC ABSORPTION SPECTROPHOTOMETRY (ANALYTIK-JINA ZEENIT 700P), (B) UV-VIS-NIR SPECTROPHOTOMETER (CARY 5000, VARIAN).	36
FIGURE 20: TEM IMAGES OF GO (A) AND HAP/G (B), SELECTED AREA ELECTRON DIFFRACTION PATTERNS FOR GO (C) AND HAP/G (D), HR-TEM IMAGE OF HAP ON HAP/G COMPOSITE (E), TEM IMAGE OF ODA/HAP/G (F), EDX SPECTRA OF GO, HAP/G AND ODA/HAP/G (G).	47
FIGURE 21: X-RAY DIFFRACTOGRAMS OF GO, HAP/G AND ODA/HAP/G.	49
FIGURE 22: FTIR SPECTRA OF GO, HAP/G AND ODA/HAP/G.	52

FIGURE 23: RAMAN SPECTRA OF GRAPHITE, ODA/HAP/G AND GRAPHENE OXIDE.....	54
FIGURE 24: (A) ZETA POTENTIAL OF HAP/G AND ODA/HAP/G AT DIFFERENT PH, (B) PARTICLE SIZE DISTRIBUTION HISTROGRAM FOR EMULSIFIED OIL.....	56
FIGURE 25: EFFECT OF CONTACT TIME ON THE SORPTION CAPACITY (A) AND THE LINEAR FITTING OF THE EXPERIMENTAL DATA USING THE PSEUDO-FIRST-ORDER (B) AND PSEUDO-SECOND-ORDER KINETIC EQUATION (C) OF Cd²⁺ AND Pb²⁺ IONS ONTO HAP/G (M= 0.05 G, Co= 200 MG/L AND V= 100 ML).	59
FIGURE 26: EFFECT OF THE INITIAL CONCENTRATION OF Cd²⁺ AND Pb²⁺ ON THE SORPTION CAPACITY OF HAP/G (PH=5.5, ADSORBENT DOSAGE=0.05 G).....	61
FIGURE 27: (A) THE LINEAR FITTING OF EXPERIMENTAL DATA OF THE ADSORPTION OF Pb²⁺ AND Cd²⁺ ONTO HAP/G USING LANGMUIR SORPTION ISOTHERM. (B) LANGMUIR'S SEPARATION FACTOR (R_L) FOR THE ADSORPTION OF DIFFERENT INITIAL METAL IONS CONCENTRATIONS ONTO HAP/G.....	63
FIGURE 28: TEMKIN (A) AND D-R (B) ISOTHERM MODELS OF THE EXPERIMENTAL DATA FOR THE SORPTION PROCESS OF Pb AND Cd IONS ON HAP/G AT TEMPERATURE 298K.....	65
FIGURE 29: THE LINEAR FITTING OF EXPERIMENTAL DATA OF THE ADSORPTION OF Cd²⁺ AND Pb²⁺ ONTO HAP/G USING FREUNDLICH ISOTHERM.....	66
FIGURE 30: EFFECT OF PH ON THE ADSORPTION CAPACITY (A) AND ON THE REMOVAL EFFICIENCY, % (B) OF Cd²⁺ AND Pb²⁺ IONS (INITIAL CONCENTRATION =200 MG/L) BY 0.05 G OF HAP/G.....	70
FIGURE 31: EFFECT OF ADSORBENT DOSAGE OF HAP/G ON THE (A) Pb²⁺ AND (B) Cd²⁺ UPTAKE AND REMOVAL EFFICIENCY (INITIAL METAL IONS CONCENTRATION WAS 200 MG/L, PH=5.5).....	72
FIGURE 32: EDX PATTERN OF HAP/G AFTER ADSORPTION OF Pb²⁺ AND Cd²⁺.....	73
FIGURE 33: EFFECT OF CONTACT TIME ON THE SORPTION CAPACITY OF (A) Fe³⁺ AND (B) MN²⁺ IONS (M= 0.05 G, Co= 200 MG/L AND V= 100 ML) ONTO HAP/G.....	75
FIGURE 34: THE LINEAR FITTING OF THE EXPERIMENTAL DATA USING PSEUDO-FIRST-ORDER AND PSEUDO-SECOND-ORDER KINETIC EQUATION FOR Fe³⁺ AND MN²⁺.....	77
FIGURE 35: EFFECT OF INITIAL MINERAL IONS CONCENTRATION OF (A) Fe³⁺ AND (B) MN²⁺ ON THE SORPTION CAPACITY OF HAP/G (PH=5.5, ADSORBENT DOSAGE=0.05 G).....	79
FIGURE 36: THE LINEAR FITTING OF EXPERIMENTAL DATA OF THE ADSORPTION OF Fe³⁺ AND MN²⁺ ONTO HAP/G USING FREUNDLICH ISOTHERM.....	80

FIGURE 37: (A) THE LINEAR FITTING OF EXPERIMENTAL DATA OF THE ADSORPTION OF Fe^{3+} AND Mn^{2+} ONTO HAP/G USING LANGMUIR SORPTION ISOTHERM. (B) LANGMUIR'S SEPARATION FACTOR, R_L FOR THE ADSORPTION OF DIFFERENT INITIAL Fe^{3+} AND Mn^{2+} CONCENTRATIONS ONTO HAP/G.	82
FIGURE 38: TEMKIN (A) AND D-R (B) ISOTHERM MODELS OF THE EXPERIMENTAL DATA FOR THE SORPTION PROCESS OF FE AND MN IONS ON HAP/G AT TEMPERATURE 298K.	84
FIGURE 39: EFFECT OF PH ON THE ADSORPTION CAPACITY (A) AND ON THE REMOVAL EFFICIENCY, % (B) OF Fe^{3+} AND Mn^{2+} MINERAL IONS (INITIAL CONCENTRATION =200 MG/L) BY 0.05 G OF HAP/G.	88
FIGURE 40: EFFECT OF ADSORBENT DOSAGE OF HAP/G ON THE (A) Fe^{3+} AND (B) Mn^{2+} UPTAKE AND REMOVAL EFFICIENCY (INITIAL MINERAL IONS CONCENTRATION WAS 200 MG/L, PH=5.5).	90
FIGURE 41: EDX PATTERN OF HAP/G AFTER ADSORPTION OF Fe^{3+} AND Mn^{2+}.	91
FIGURE 42: THE EFFECT OF CONTACT TIME OF MB (200 MG/L) ADSORPTION ON HAP/G COMPOSITE (A), A KINETIC MODEL OF PSEUDO-FIRST-ORDER (B) AND LINEAR FITTING OF EXPERIMENTAL DATA USING PSEUDO-SECOND-ORDER (C).	95
FIGURE 43: EFFECT OF THE MB'S INITIAL CONCENTRATION ON THE EQUILIBRIUM SORPTION CAPACITY AND REMOVAL EFFICIENCY OF MB BY THE HAP/G COMPOSITE (PH=5.5, ADSORBENT DOSAGE=0.05 G).	97
FIGURE 44: (A) FREUNDLICH, (B) LANGMUIR SORPTION ISOTHERMS AND (C) LANGMUIR'S SEPARATION FACTOR, R_L FOR THE ADSORPTION OF MB ONTO HAP/G.	100
FIGURE 45: TEMKIN (A) AND D-R (B) ISOTHERM MODELS OF THE EXPERIMENTAL DATA FOR THE SORPTION PROCESS OF MB ON HAP/G AT TEMPERATURE 298K.	101
FIGURE 46: EFFECT OF PH ON THE SORPTION CAPACITY OF MB BY HAP/G COMPOSITE (INITIAL CONCENTRATION OF 200 MG/L, ADSORBENT DOSAGE 0.05 G).	103
FIGURE 47: EFFECT OF ADSORBENT DOSAGE OF HAP/G ON THE MB'S UPTAKE AND REMOVAL EFFICIENCY (INITIAL MB'S CONCENTRATION WAS 200 MG/L, PH=5.5).	104
FIGURE 48: (A) EFFECT OF CONTACT TIME ON OIL SORPTION BY HAP/G AND ODA/HAP/G. (B) A LINEAR FIT OF THE EXPERIMENTAL DATA OBTAINED USING THE PSEUDO-SECOND-ORDER KINETIC EQUATION.	107
FIGURE 49: EFFECT OF THE INITIAL OIL CONCENTRATION ON THE REMOVAL OF OIL BY THE ODA/HAP/G SORBENT (PH 5.8, ADSORBENT DOSAGE 0.05 G).	108



FIGURE 50: LINEAR FITS OF THE EXPERIMENTAL DATA OBTAINED USING THE (A) FREUNDLICH AND (B) LANGMUIR SORPTION ISOTHERMS, (C) LANGMUIR'S SEPARATION FACTOR, R_L FOR THE ADSORPTION OF OIL ONTO ODA/HAP/G..... 111

FIGURE 51: TEMKIN (A) AND D-R (B) ISOTHERM MODELS OF THE EXPERIMENTAL DATA FOR THE SORPTION PROCESS OF THE EMULSIFIED CRUDE OIL ON ODA/HAP/G AT TEMPERATURE 298K..... 113

FIGURE 52: EFFECT OF PH ON THE REMOVAL OF OIL BY THE ODA/HAP/G SORBENT (INITIAL CONCENTRATION OF 200 MG/L, ADSORBENT DOSAGE 0.05 G). 114

FIGURE 53: EFFECT OF ODA/HAP/G DOSAGE ON OIL REMOVAL (INITIAL CONCENTRATION OF 200 MG/L, PH 5.8)..... 115



LIST OF TABLES

TABLE 1: MAJOR LIMITATIONS ASSOCIATED WITH CONVENTIONAL WATER PURIFICATION METHODS	24
TABLE 2: THE PARAMETERS OBTAINED FROM FITTING THE SORPTION DATA OF Cd^{2+} AND Pb^{2+} IONS ONTO HAP/G USING THE PSEUDO-SECOND-ORDER KINETIC EQUATION. R^2 IS THE REGRESSION COEFFICIENT FOR THE LINEAR PLOT.	60
TABLE 3: THE PARAMETERS OBTAINED FROM FITTING THE SORPTION DATA OF Cd^{2+} AND Pb^{2+} IONS ONTO HAP/G USING THE LANGMUIR ISOTHERM EQUATION. R^2 IS THE REGRESSION COEFFICIENT FOR THE LINEAR PLOT.	64
TABLE 4: THE PARAMETERS OBTAINED FROM FITTING THE SORPTION DATA OF Cd^{2+} AND Pb^{2+} IONS ONTO HAP/G USING THE FREUNDLICH ISOTHERM EQUATION. R^2 IS THE REGRESSION COEFFICIENT FOR THE LINEAR PLOT.	67
TABLE 5: A COMPARISON OF ADSORPTION CAPACITY FOR Cd^{2+} IONS BY SEVERAL SORBENTS AT ROOM TEMPERATURE.	67
TABLE 6: A COMPARISON OF ADSORPTION CAPACITY FOR Pb^{2+} IONS BY SEVERAL SORBENTS AT ROOM TEMPERATURE.	68
TABLE 7: THE PARAMETERS OBTAINED FROM FITTING THE SORPTION DATA OF Fe^{3+} AND Mn^{2+} IONS ONTO HAP/G USING THE PSEUDO-SECOND-ORDER KINETIC EQUATION. R^2 IS THE REGRESSION COEFFICIENT FOR THE LINEAR PLOT.	77
TABLE 8: THE PARAMETERS OBTAINED FROM FITTING THE SORPTION DATA OF Fe^{3+} AND Mn^{2+} IONS ONTO HAP/G USING FREUNDLICH AND LANGMUIR ISOTHERMS EQUATIONS.	83
TABLE 9: A COMPARISON OF ADSORPTION CAPACITY FOR Mn^{2+} IONS BY SEVERAL SORBENTS AT ROOM TEMPERATURE.	85
TABLE 10: A COMPARISON OF ADSORPTION CAPACITY FOR Fe^{3+} IONS BY SEVERAL SORBENTS AT ROOM TEMPERATURE.	86
TABLE 11: PSEUDO-SECOND-ORDER KINETIC DATA OF METHYLENE BLUE SORPTION ON HAP/G NANOCOMPOSITE.	95
TABLE 12: COMPARISON OF SORPTION CAPACITIES FOR MB WITH VARIOUS SORBENTS.	102
TABLE 13: PSEUDO-SECOND-ORDER KINETICS OF DISPERSED OIL SORPTION BY THE HAP/G AND ODA/HAP/G NANOCOMPOSITES.	107
TABLE 14: COMPARISON OF SORPTION CAPACITIES FOR EMULSIFIED OIL WITH VARIOUS SORBENTS.	111

9. The influence of pH on the sorption process was carried out in the pH range from 3-11 and the results showed that as pH increases sorption capacity increases.
10. A great increase in the sorption percentage was observed with the quantity of sorbent dosage.

In future work, we are going to study intensively the factors which may affect the capability of HAp/G and other magnetic nanocomposites to remove more types of water pollutants. We also look forward to studying more applicable process using a fixed-bed flow-through sorption column.

CHAPTER (6)

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تصنيع وتوصيف المتراكبات النانومترية للهيدروكسي أباتيت و الكربون لمعالجة المياه

إعداد

محمد على حسن على

رسالة مقدمة

إلى

كلية العلوم

كجزء من متطلبات الحصول علي درجة

الدكتوراه

(الكيمياء الفيزيائية)

قسم الكيمياء

كلية العلوم

جامعة القاهرة

(2019)