## Aqueous Solution

**1- Removal of heavy metals from aqueous solution using carbon-based adsorbents: A review**

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**JOURNAL OF WATER PROCESS ENGINEERING**
**Volume**
37
**Article Number**
101339
**DOI**
10.1016/j.jwpe.2020.101339
**Published**
OCT 2020
**Indexed**
2020-10-20
**Document Type**
Review

**Abstract**

Heavy metal contamination has been a serious threat to environment and human health. Carbon-based materials, from biochar/activated carbon to modified materials (i.e. carbon nanotubes-based materials, and graphene-based materials), have been widely studied as efficient adsorbents for the heavy metal removal from aqueous solutions. This review discussed the recent achievements in adsorption isotherms, adsorption kinetics and adsorption mechanism according to the existing forms of heavy metals in water. The effect of process conditions, such as temperature, pH value, and coexisting ions, on adsorption performance are combed, and the universal guidance law is obtained. The physical adsorption, electrostatic interaction, ion exchange, surface complexation, and precipitation/coprecipitation play important roles in heavy metals adsorption process. In addition to the common activated carbon(AC), biochar(BC) and the emerging carbon nanotubes(CNTs) and graphene(GN) adsorbent show good development potentials. Meanwhile, though the modified carbonaceous materials can achieve high adsorption capacity and removal efficiency of heavy metals, the modification operation is complex, especially chemical modification. Acid and alkali solution are often used to regenerate spent materials in desorption, however, further studies of other desorption reagent are really needed. This review highlights the removal of heavy metal ions from aqueous solution using carbon-based materials as adsorbents, and discusses the existing deficiencies and suggestions on further study.

**Keywords**
**Author Keywords**
Heavy metalAdsorptionCarbon-Based materialsDesorption

**Aqueous Solution**

**Keywords Plus**
MAGNETIC GRAPHENE OXIDEWASTE-WATERBETA-CYCLODEXTRINACTIVATED CARBONCITRIC-ACIDBISPHENOL-AFUNCTIONAL-GROUPSMETHYLENE-BLUECONTAMINATION ASSESSMENTCOMPETITIVE ADSORPTION

## Aqueous Solution

**2- Biosorption of aluminum ions from aqueous solutions using non-conventional low-cost materials: A review**

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(provided by Clarivate)

JOURNAL OF WATER PROCESS ENGINEERING
**Volume**
40
**Article Number**
101925
**DOI**
10.1016/j.jwpe.2021.101925
**Published**
APR 2021
**Indexed**
2021-04-17
**Document Type**
Review

**Abstract**

Aluminum is one of the most common pollutant found in wastewaters from processes like mining, galvanizing and metal alloy casting. The release of aluminum-contaminated effluents into water bodies may cause several harmful effects on the environment and living beings due to its capacity for gradual bioaccumulation. Biosorption is a process that has gained prominence in water/wastewater treatment for its satisfactory results in removing metal pollutants. This technology has many advantages, like being low-cost and eco-friendly, making it one of the main alternatives to conventional approaches. This review features an overview of studies on biosorption of Al3+ ions, highlighting the performance of biosorbents derived from bacterial, fungal and algal biomasses, and agro-industrial wastes. For this purpose, the main mechanisms involved in this process are investigated and discussed regarding its kinetic, equilibrium and thermodynamic behavior. The application of biosorption for treating real effluents and regeneration/reuse of the biosorbents are also presented. Finally, the prospects for future research on Al3+ biosorption are outlined.

**Keywords**
**Author Keywords**
BiosorptionAluminumMetalsWastewater treatmentLow-cost biosorbentsBiomass
**Keywords Plus**

**Aqueous Solution**

HEAVY-METAL IONSACID-MINE DRAINAGEWASTE-WATERCRYSTAL VIOLETTOXIC METALSRICE HUSKREMOVALADSORPTIONKINETICSIRON

## Aqueous Solution

**3- Recent advances in removal techniques of Cr(VI) toxic ion from aqueous solution: A comprehensive review**

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(provided by Clarivate)

**JOURNAL OF MOLECULAR LIQUIDS**
**Volume**
329
**Article Number**
115062
**DOI**
10.1016/j.molliq.2020.115062
**Published**
MAY 1 2021
**Early Access**
FEB 2021
**Indexed**
2021-04-28
**Document Type**
Review

**Abstract**

Nowadays, due to the economic and industrial development, water contaminated with heavy metals is a significant concern and one of the acute global environmental problems. Hexavalent chromium is an important metal ion contaminant with high toxicity to bacteria, animals, plants and human, even at trace concentrations. It is potentially carcinogenic and mutagenic and can cause a serious threat to living organisms, so the efficient removal of Cr(VI) before releasing into the environment has become an essential issue from both biological and environmental perspectives. Currently, numerous techniques have been studied for Cr (VI) removal and its recycling from the wastewater. In the present study, the available Cr(VI) remediation strategies have been comprehensively reviewed for aqueous solutions and a broad range of recent research works have been evaluated. The major factors influencing the removal efficiency and mechanisms of various processes have also been briefly discussed. This can be useful for further developing Cr (VI) removal technologies to be more efficient and bridging the gap between laboratory findings and industrial applications. 

**Keywords**

**Aqueous Solution**

**Author Keywords**

Hexavalent chromiumRemoval processPhysical treatmentChemical treatmentAdsorbent

## Aqueous Solution

**4- 18.77 % Efficiency Organic Solar Cells Promoted by Aqueous Solution Processed Cobalt(II) Acetate Hole Transporting Layer**

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**ANGEWANDTE CHEMIE-INTERNATIONAL EDITION**
**Volume**
60
**Issue**
41
**Page**
22554-22561
**DOI**
10.1002/anie.202110550
**Published**
OCT 4 2021
**Early Access**
SEP 2021
**Indexed**
2021-09-12
**Document Type**
Article

**Abstract**

A robust hole transporting layer (HTL), using the cost-effective Cobalt(II) acetate tetrahydrate (Co(OAc)(2).4 H2O) as the precursor, was simply processed from its aqueous solution followed by thermal annealing (TA) and UV-ozone (UVO) treatments. The TA treatment induced the loss of crystal water followed by oxidization of Co(OAc)(2).4 H2O precursor, which increased the work function. However, TA treatment differently realize a high work function and ideal morphology for charge extraction. The resulting problems could be circumvented easily by additional UVO treatment, which also enhanced the conductivity and lowered the resistance for charge transport. The optimal condition was found to be a low temperature TA (150 degrees C) followed by simple UVO, where the crystal water in Co(OAc)(2).4 H2O was removed fully and the HTL surface was anchored by substantial hydroxy groups. Using PM6 as the polymer donor and L8-BO as the electron acceptor, a record high PCE of 18.77 % of the binary blend OSCs was achieved, higher than the common PEDOT:PSS-based solar cell devices (18.02 %).

**Keywords**
**Author Keywords**
aqueous solution processibilitycobalt(II) acetatecost-effectivehole transporting layerorganic solar cells
**Keywords Plus**

**Aqueous Solution**

ANODE BUFFER LAYERSMETAL-OXIDESLOW-TEMPERATUREFILM