

# Performance of Potassium Ferrate for the Removal of Aromatic Hydrocarbons

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## DESCRIPTION

Ferrate is a chemical reagent for treating water. The ferrate redox potential is extremely high in acidic media; it is strongly oxidised over a wide pH range and has a strong deactivating effect on microorganisms. Ferrate has a greater sterilising effect than chlorine department oxidant and exhibits superior oxidation, adsorption, and flocculation to eliminate pollutants in sewage. The greatest oxidant alternative to chlorine as a water purification agent is ferrate. Ferrate also has a high electrode potential and capacitance, making it the positive active component of the green power supply. Due to this distinctive quality, ferrates serve as dual-purpose, green oxidation reagents that are environmentally friendly.

The orthogonal crystal system includes the ferrate crystal. Ferrate, ( $K_2FeO_4$ ) has a typical tetrahedron structure. Four oxygen atoms are located in each of the four corners of the tetrahedron, which has an iron atom at its centre and a somewhat warped shape [1]. The maximum wavelength of the ferrate's absorption is 510 nm, and it is a dark purple solid with a distinctive purple tint in the solution. Ferrate ion also exhibits an absorption peak at 786 nm, which is also the particle's distinctive absorption peak [2]. Potassium ferrate, the primary component of ferrate, has a melting point of 198°C and is a solid that is dark purple in colour. At 230°C, ferrate begins to degrade in dry environments. In the highest valence state of iron, potassium ferrate contains iron (VI) ions, which have considerable oxidativity as well as selectivity. Many organic materials can be oxidised by them. Compared to conventional water treatment oxidants such as potassium permanganate, ozone, and hypochlorite, their oxidativity is significantly stronger [3]. Their normal electrode potential is 2.20 V in an acidic medium, whereas it is just 0.72 V in an alkaline one. In order to achieve great selectivity, we can vary the structure of the ferrate cations and change the pH.

Potassium ferrate may remove heavy metal pollutants from the micropolluted water, such as cadmium and manganese, and the removal rate was 80%. Additionally, organic molecules such as phenols, alcohols, organic acids, organic nitrogen, and amino acids, lipid compounds containing sulphur and benzene, as well

as several refractory chemicals, can be effectively removed by potassium ferrate. Many water sources from domestic and foreign are currently contaminated by aromatic hydrocarbon [4]. Although the concentration of aromatic hydrocarbons in water is very low, current water treatment technology is not ideal for removing them. A number of intermediates may be produced during the oxidation of aromatic hydrocarbons because of the unique stability of the benzene ring structure. There are certain potential environmental dangers, and the safety of drinking water cannot be completely assured. In light of the refractory aromatic hydrocarbon in micropolluted source water and in light of potassium ferrate treatment technology, this concludes the transformation and removal of aromatic hydrocarbons in micropolluted water [5]. The fluorescence spectrophotometer provides a quantitative analysis of aromatic hydrocarbon elimination. Three different materials have different exciting and emission wavelengths: naphthalene EX/EM is 218/332 nm, phenanthrene EX/EM is 250/362 nm and pyrene EX/EM is 238/372 nm. The scanning speed is 2400 nm/min; the excitation and emission slits are 5 nm wide. Gas chromatography-mass spectrometry is used to determine the characteristics of the phenanthrene oxidation intermediate.

## CONCLUSION

In contrast, naphthalene is more stable while phenanthrene which is more likely to undergo transformation. Phenanthrene is removed from potassium ferrate by giving an electron to Fe (VI) of the potassium ferrate oxidation system in gas chromatography and intermediate-mass spectrometry analyses. The quinone structure is a type of functional group that is more biophilic than a benzene ring, and as a result, a potential reaction pathway is suggested. It benefits the biochemical conversion process, the conversion of aromatic hydrocarbons' environmental durability features, and, to some extent, the decrease of environmental danger due to its biologically weak resistance.

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