

# Magnetic nanomaterials coated by N-methyl-D-glucamine based polymers for wastewater treatment

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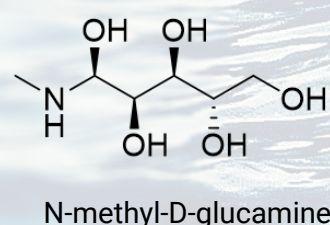
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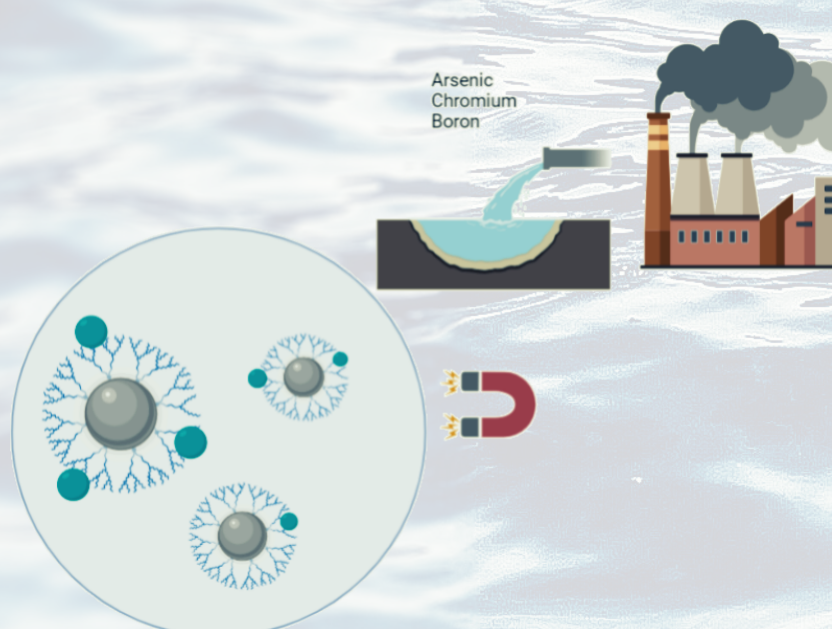
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The presence of heavy metals as pollutants in water sources increased in the past decades, due to anthropic impact causing serious threat for aquatic and human health. In particular, arsenic [As(V)] and chromium [Cr(VI)] are the most hazardous species by health authorities, so that their level of contamination is strictly regulated. However, metal contamination in ground and surface waters deriving from anthropogenic activities is scarcely supervised. [1-2]

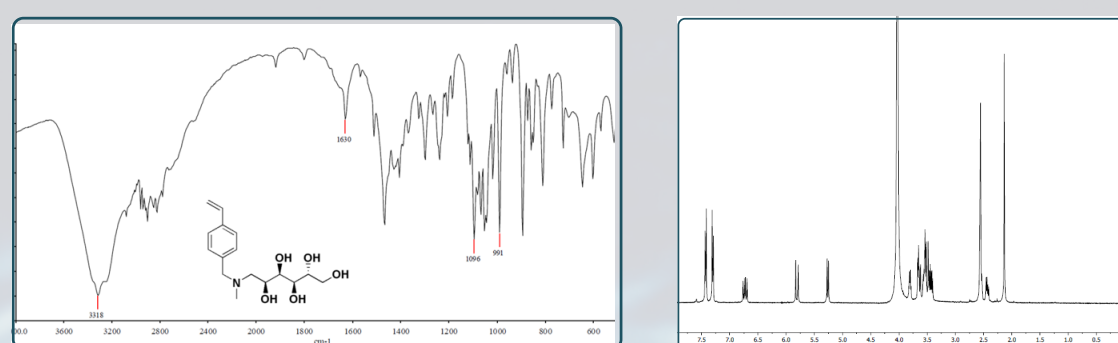
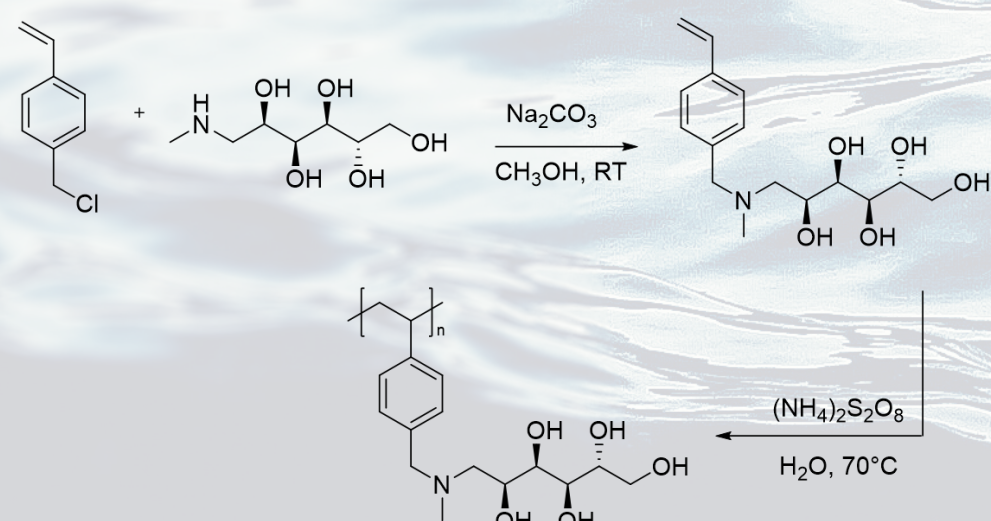
Several researchers have investigated and developed materials to remove the pollutants from the water matrix. In this optic, N-methyl-D-glucamine functionalized materials are used due to their strong affinity to metal ions species, in particular arsenic, chromium and boron ions [3].



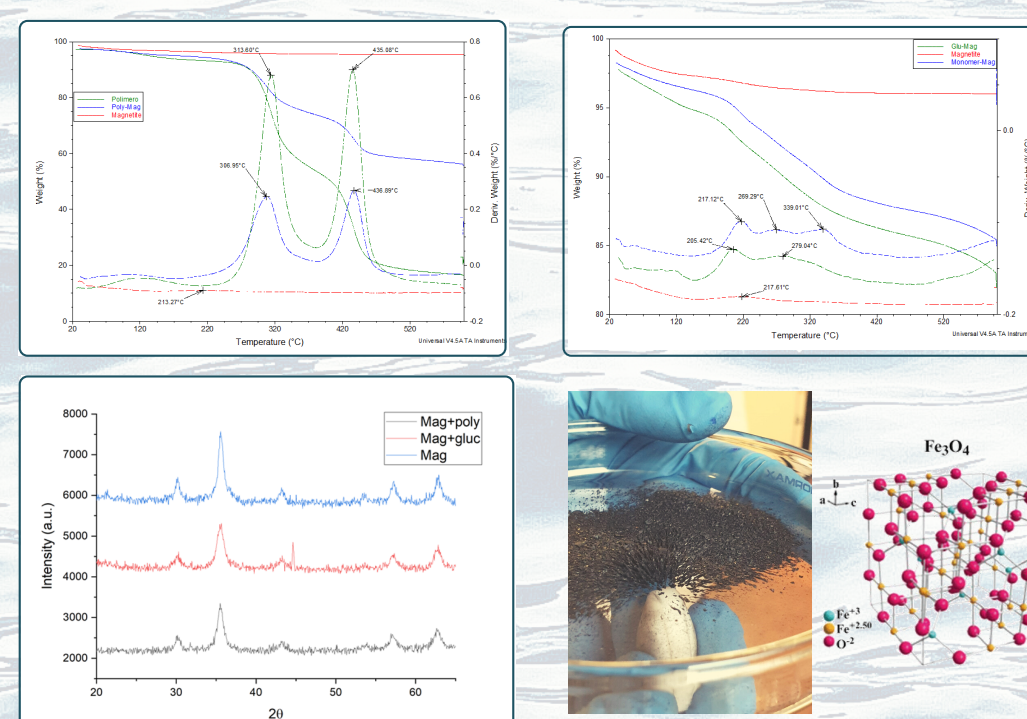
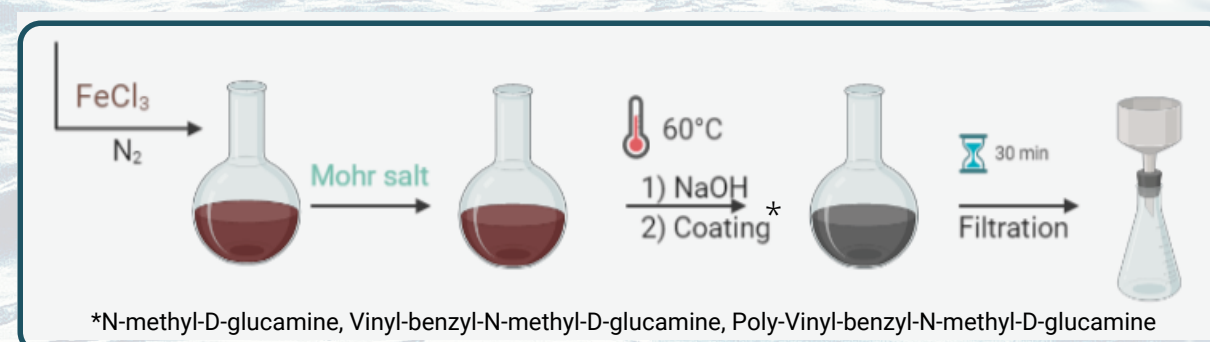
In this work intrinsically magnetic nanoparticles are coated by polymers functionalized with N-methyl-D-glucamine and used as pollutants removal.



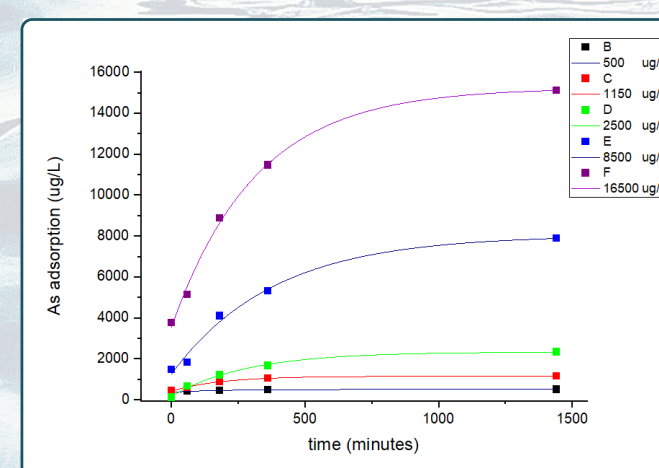
## Synthesis of polymers



## Synthesis and characterization of nano-structured materials



## Sequestration of arsenic from water



$C_0(\mu\text{g/L})$	$C_e(\mu\text{g/L})$	Retention %
500	1.7	99.7
1150	7.1	99.4
2500	162.9	93.5
8500	621.8	92.7
16500	1398.6	91.5

The combination between the high superficial area derived from nanoparticles structure and the selectivity in the removal of Arsenic have allowed to develop novel device for the adsorption of pollutants from water. The water treated with a defined amount of magnetic nanoparticles (5 mg) showed a value of pollutants below the law limit for the first two concentrations. Different adsorption tests have been conducted changing the concentration of Arsenic, the retention efficiency against arsenic (V) is greater than 90%.

## References

- [1] Bolisetty S. et al. *Chemical Society Reviews* 48 (2019) 463–487.
- [2] Tchounwou P.B. et al. *Molecular, clinical and environmental toxicology* 101 (2012) 133–164
- [3] Mecca T. et al. *Chemical Engineering Journal* 399 (2020): 125753.