

USAGE OF PLANT EXTRACTS IN GREEN SYNTHESIS OF IRON NANOPARTICLES

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INTRODUCTION

Iron-based nanoparticles have gained attention due to their specific properties such as magnetic properties, availability, versatility and multivalent oxidation states. Their nanoparticles acts as ferromagnets and ferrimagnets, but at sizes smaller than 30 nm it was observed that they show superparamagnetic properties. Because of that, iron nanoparticles have been widely used in field of biomedicine and pharmacy as sensors or catalysts. Common methods of their synthesis include long-term chemical and physical methods which are harmful for the environment. In order to prevent further pollution, scientists are trying novel greener biological methods, which include bioreduction usually in one step without using hazardous chemicals.

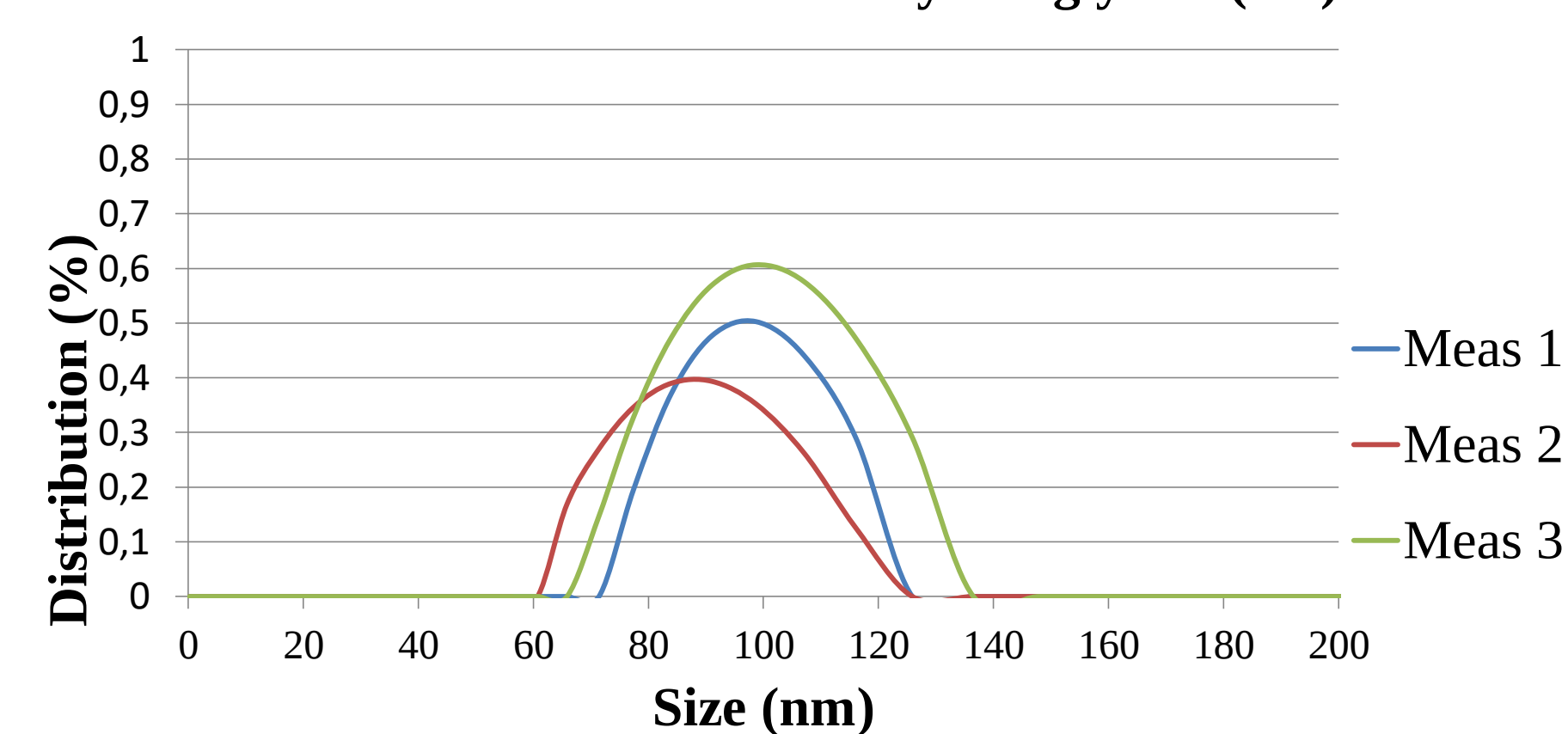
In this study iron-based nanoparticles were synthesized using plants extract in GRAS solvents and DESs. The prepared extracts were tested for antioxidant activity (DPPH method) and total phenol content was measured by Folin-Ciocalteu method. Afterwards, synthesised nanoparticles were characterized by application of appropriate techniques.

RESULTS

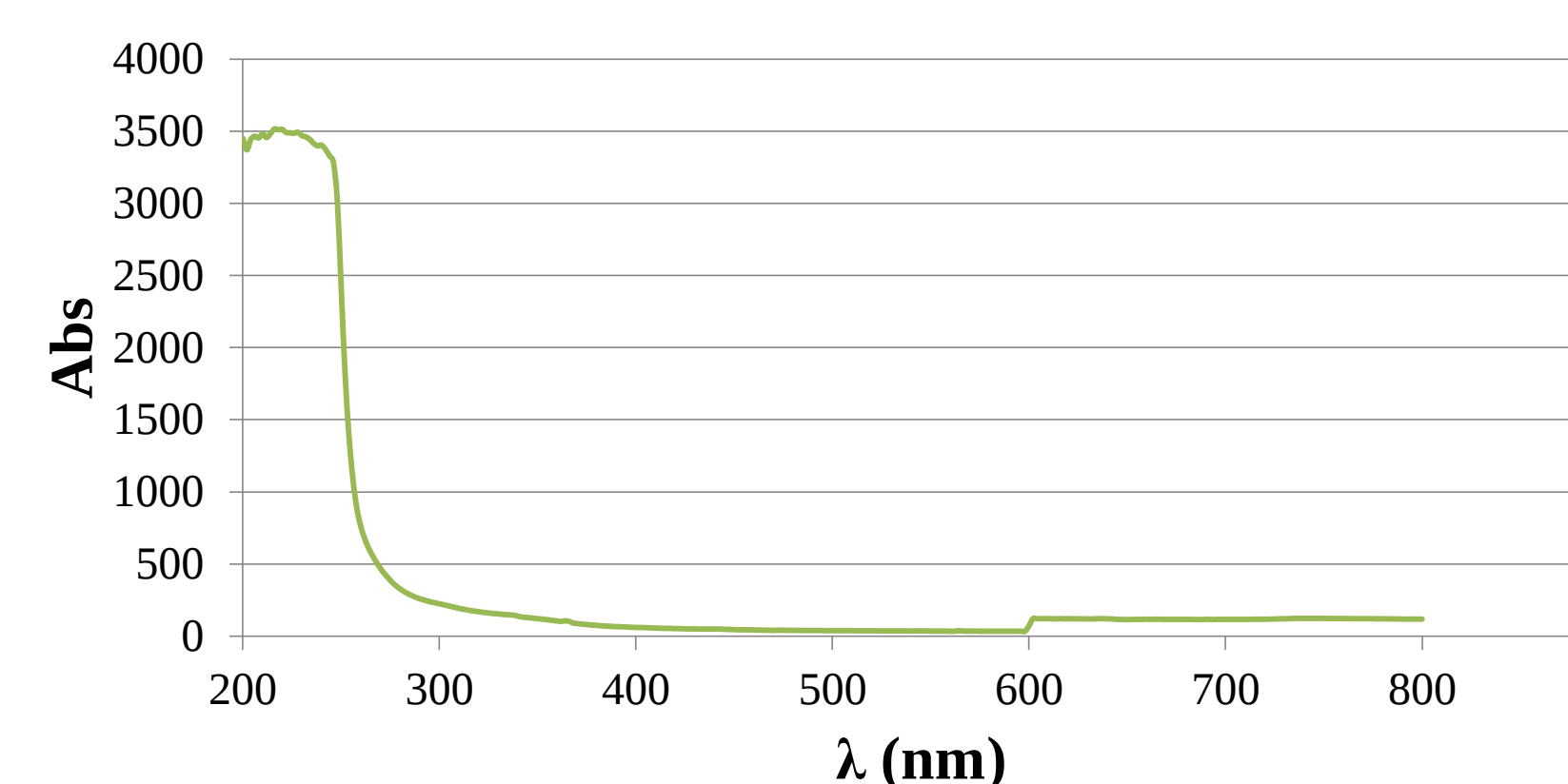
Table 1 Total phenol content and antiradical activity of plant extracts.

PLANT	DPPH INHIBITION (%)		TOTAL PHENOL CONTENT (µg/mL GAE)	
	GRAS	DES	GRAS	DES
<i>Eucalyptus globulus</i>	93	91	204,3	186,8
<i>Gomphrena globosa</i>	14	15	158,5	-
<i>Illicium verum</i>	94	92	196,8	191,8
<i>Alchemilla vulgaris</i>	95	91	226,5	198,5
<i>Cannabis sativa</i>	53	64	177,5	193,6

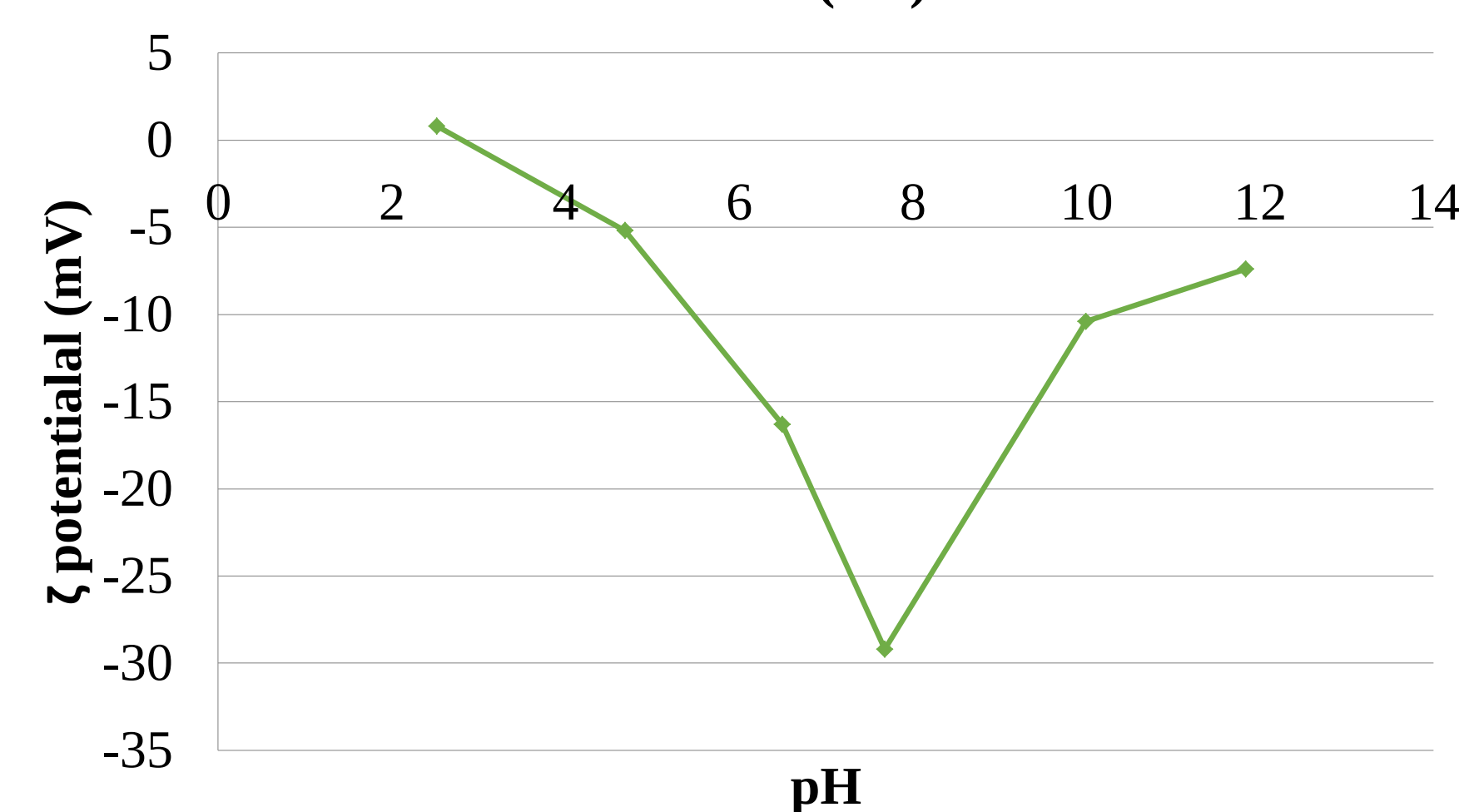
Size distribution of NPs synthesized from *A. vulgaris* extract in DES betaine/ethylene glycole (1:2)



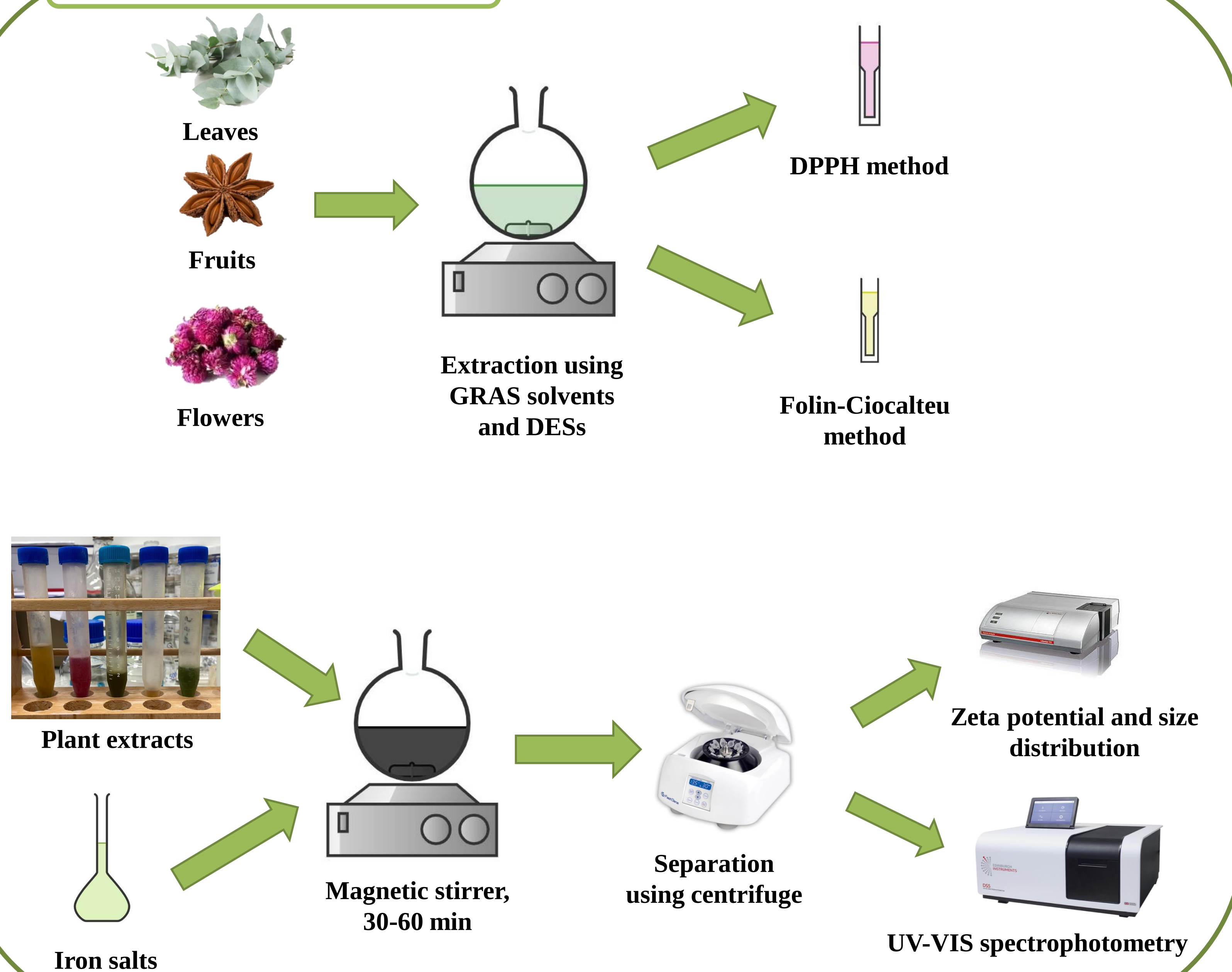
Absorption spectrum of NPs synthesized from *A. vulgaris* extract in DES betaine/ethylene glycole (1:2)



Zeta potential of NPs synthesized from *A. vulgaris* extract in DES betaine/ethylene glycole (1:2)



MATERIALS AND METHODS



CONCLUSION

- Plant extracts with more phenols have shown greater ability for bioreduction of iron salts.
- Antiradical activity do not have any impact on synthesis.
- *Alchemilla vulgaris* extracted by DES betaine:ethylene glycole (1:2) has shown as the most favorably plant extract among the others.
- Synthesized nanoparticles were smaller than 100 nm.
- Maximum absorption was in UV spectrum (220 nm).
- Plant extracts were suitable for iron-based nanoparticles synthesis.

ACKNOWLEDGMENT

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