ULST Timisoara
Multidisciplinary Conference on Sustainable Development
30-31 May 2024

POLYPHENOL DERIVATIZATION IN THE COMBAT AGAINST OXIDATIVE STRESS

A. Tsantekidis[1,*], S. Matsia[1], A. Hatzidimitriou[2], A. Salifoglou[1]
[1] *Laboratory of Inorganic Chemistry and Advanced Materials, School of Chemical Engineering, Aristotle University of Thessaloniki, Thessaloniki 54124, Greece*
[2] *Laboratory of Inorganic Chemistry, School of Chemistry, Aristotle University of Thessaloniki, Thessaloniki 54124, Greece*
E-mail: achilleat@cheng.auth.gr

ABSTRACT – INTRODUCTION
Flavonoids and their therapeutic activity

Flavonoids, such as flavones and flavonols, are plant polyphenolic compounds, which are found in many natural plant species, especially fruits and vegetables.[1] As the most common natural flavonoid, **quercetin (QC)** and its derivatives are widely present in nuts, beverages, and Chinese herbal medicine. Flavonoids have proven to be potent antioxidant agents, due to their ability to prevent injury, caused by free radicals, through mechanisms such as direct scavenging of reactive oxygen and nitrogen species (ROS and RNS), activation of antioxidant enzymes, and sequestering metal chelation. Their ability to chelate metal ions is very important, since metal complexes of several flavonoids, like morin and quercetin, have shown potent antioxidant activity in *in vitro* studies.[2] A significant problem, however, of flavonoids in potential applications in health, arises due to its low solubility in aqueous media. To that end, a challenge emerges to **increase the solubility and bioavailability of flavonoids** so that their biological activity effectively reaches all engaging targets in (sub)cellular media (**Fig. 1**). To that end, **sulfonic derivatives of quercetin (QSA)** have been reported, albeit with no significant detail, to exhibit **antibacterial** and **antitumor** activities to go along with their **antioxidant** properties.[3] Based on the existing literature, our research tried to focus on flavonoid bioavailability and in so doing develop well-defined methodologies providing soluble flavonoids in aqueous media. Furthermore, enhancement of bioavailability of derivatized flavonoids was sought after through reactivity of sulfonic derivatives of quercetin and their complexes with metal ions.[3,4] The collective properties of the produced materials set the basis for further inquiry into the biological role of the derivatized flavonoids and hybrid metalloforms thereof, thus meriting future applications in health and theranostics.

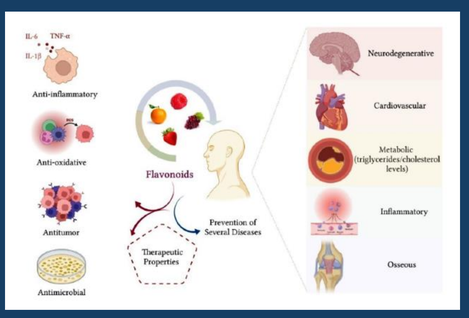
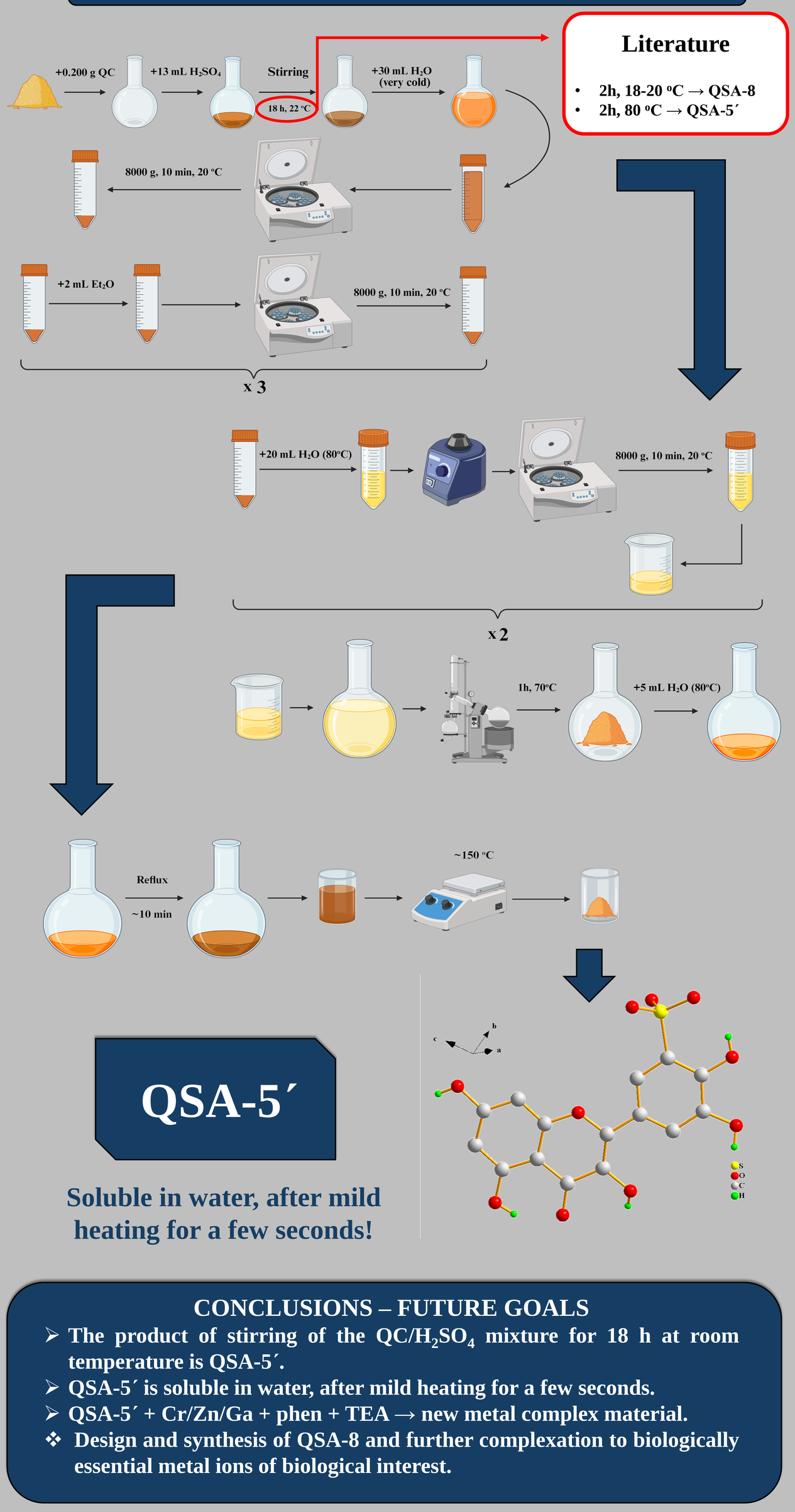


Fig. 1: Flavonoid therapeutic effects

MATERIALS AND METHODS

Flow chart Synthesis of Quercetin-5´-sulfonic acid (QSA-5´)



Literature

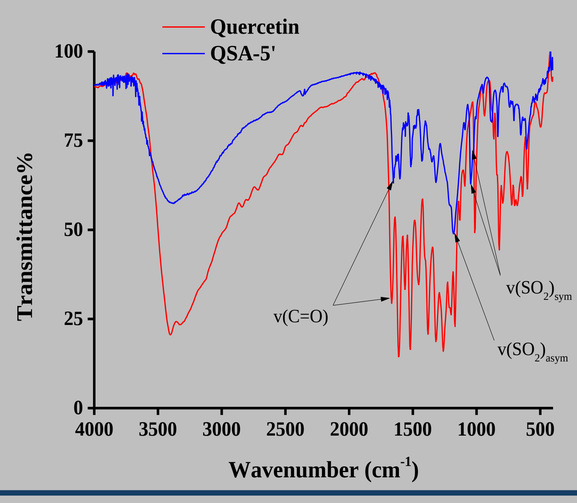
- **2h, 18-20 °C → QSA-8**
- **2h, 80 °C → QSA-5´**

QSA-5´

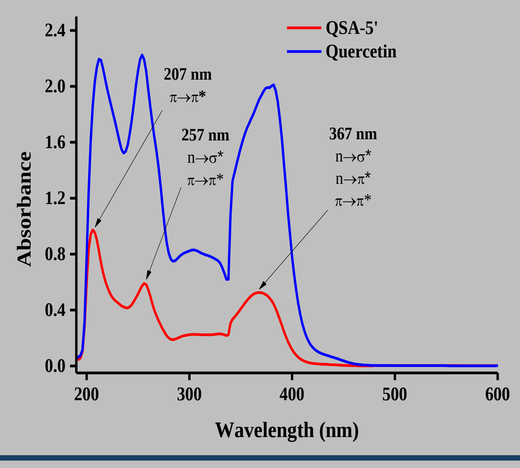
Soluble in water, after mild heating for a few seconds!

RESULTS

FT-IR



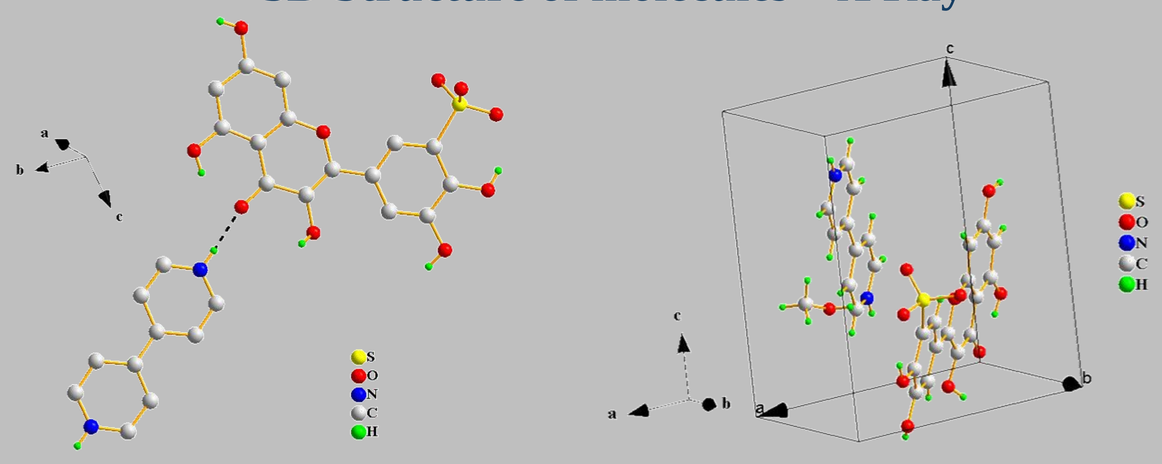
UV-Visible



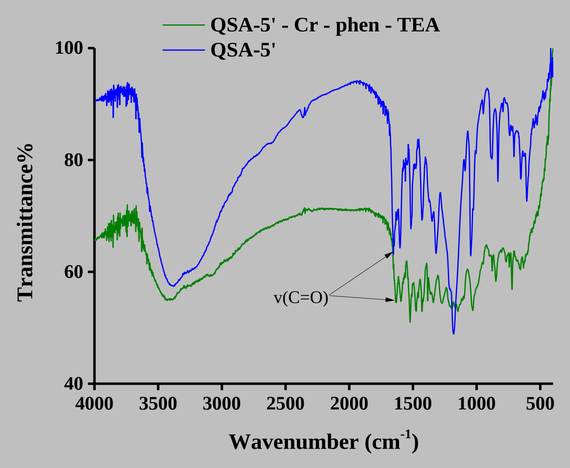
NMR

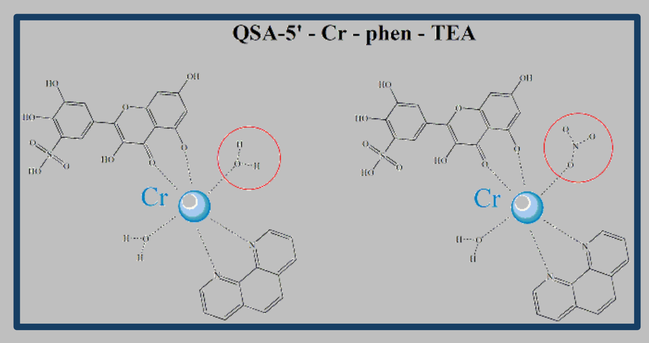
Atom number	Quercetin	QSA-5’
H-6	6.17	6.20, 6.21
H-8	6.38	6.42 (double)
H-2´	7.68	7.63, 7.64
H-5´	6.89	-
H-6´	7.55	7.89 (double)

3D Structure of molecules – X Ray



Metal Complex Materials





CONCLUSIONS – FUTURE GOALS

- **The product of stirring of the QC/H_2SO_4 mixture for 18 h at room temperature is QSA-5´.**
- **QSA-5´ is soluble in water, after mild heating for a few seconds.**
- **QSA-5´ + Cr/Zn/Ga + phen + TEA → new metal complex material.**
- **Design and synthesis of QSA-8 and further complexation to biologically essential metal ions of biological interest.**

REFERENCES

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