Exploration of Aza-aurone, Thioaurone and Triazole Systems for Fluorescence in Bio-imaging

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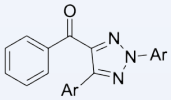
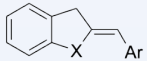
Compounds of Study

Fluorescence has attracted much attention because of its advantages over other biological imaging techniques. The fluorescence properties of a chemical can make for effective imaging and identification of useful molecules in a cell. Aurones are a strongly colored family of flavonoids that have been shown to be very fluorescent.



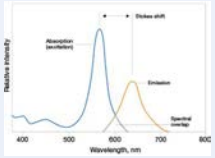
Aurone Triazole



X = O Aurone
X = S Thioaurone
X = NH Azaaurone

How do aurones fluoresce?

Fluorescence occurs when a molecule relaxes after an excitation of some energy (λ). While it relaxes, the molecule emits another wavelength. This emission is fluorescence.

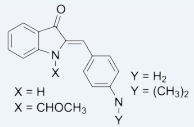


Objective

Identify a fluorescent aurone probe capable of utilization in aqueous environments (inside a cell), while characterizing aurone subgroups for further application. With aurones being brightly colored, there is a possible use of tagging aurones to molecules in a cell to identify concentration or presence of metabolites, proteins, antibodies, etc.

Azaaurones

The aza- family of aurones offer multiple Sites of addition wherein acetyl groups, as well as a dimethyl group, can be implemented.

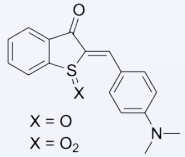


Variation in structure while maintaining the aromaticity is crucial and is proposed to enable photo-identification based on chemical profile.

Thioaurones

Thioaurones vary In structure from aurones due to the Sulphur group. This addition has potential effect on the overall photo-properties due to the electron withdrawing capabilities. Sulphur also aids in a means of addition of multiple =O groups, which may lead to changes in fluorescence.

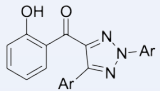
Differences between π electron overlap of Sulphur compared to Oxygen may hinder aromaticity slightly.



X = O
X = O_2

Aurone Triazoles

Like azaaurones, aurone triazoles are a nitrogen based species of aurones in which the integrity of the aurone base is impacted without breaking the aromatic nature of the compound. Addition of aromatic groups in the N-2 and C-4 positions were tested to determine if location of aromatic group/electron clustering would Impact the photo-properties.



Ar = Phenol
Ar = Dimethylamino

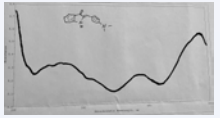
Methods

After synthesis of all compounds, measurements of fluorescence followed by UV/Vis properties were taken. Fluorescence and UV/Vis was tested using a 1 μM aliquots on fluorometer and spectrophotometer respectively.

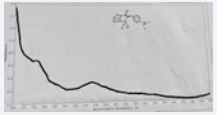
Conclusion

On completion of all tests. It was determined that:

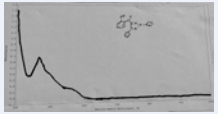
Azaaurones - Showed a great amount of Uv/Vis activity, but were only slightly fluorescent



Thioaurones - UV/Vis activity was poor. In addition, thioaurones were shown to be weakly fluorescent.



Aurone Triazoles - Displayed greater amounts of UV/Vis activity, but were not strongly fluorescent; against predicted values.



References

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