UNDERSTANDING HOMEOPATHIC POTENCIES THROUGH THE USE OF SOLVATOCHROMIC DYES

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EVIDENCE BASED HOMEOPATHY RESEARCH WEBINAR

SOCIETY OF HOMEOPATHS
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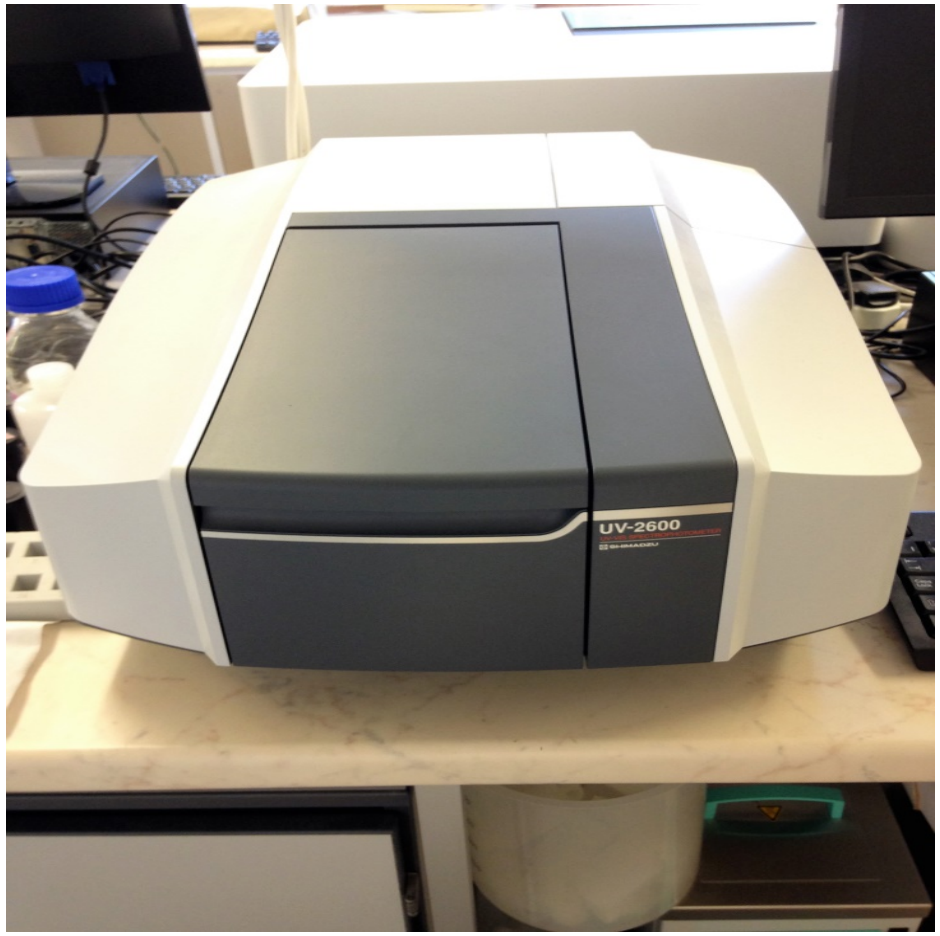
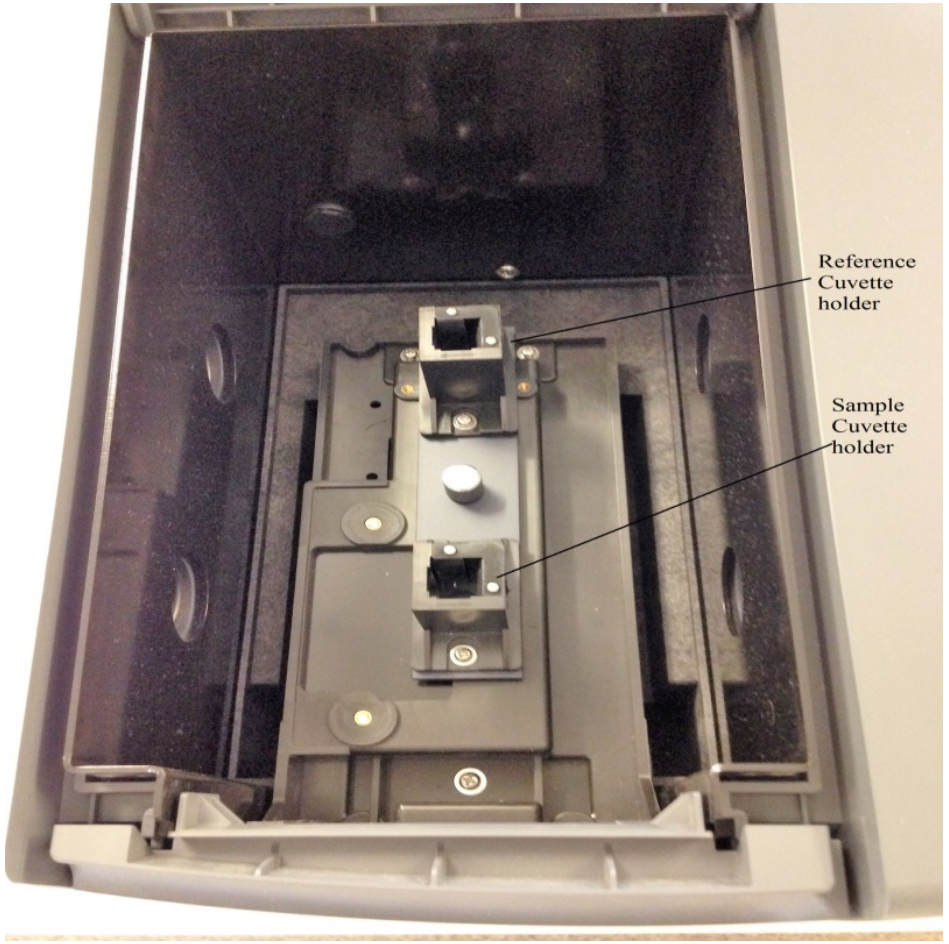
Why carry out fundamental research in homeopathy?

- To find out how homeopathy works (mechanism is more convincing for critics than clinical evidence)
- Understanding how homeopathic medicines work is likely to affect profoundly how we prescribe and may reduce many of the inconsistencies we see in clinical practice
- Understanding how homeopathy works may change or even revolutionise how we manufacture remedies
- Appreciating the true differences between potencies would help us make more reliable and consistent potency choices.
- Understanding what potencies are may lead to improved storage and transport of remedies. Just how susceptible are potencies to X-rays, uv-light, magnetic and electrical fields for instance?
- Understanding better how homeopathy works may lead to a deeper understanding of remedy relationships. Why are certain remedies related when they come from different kingdoms for instance?

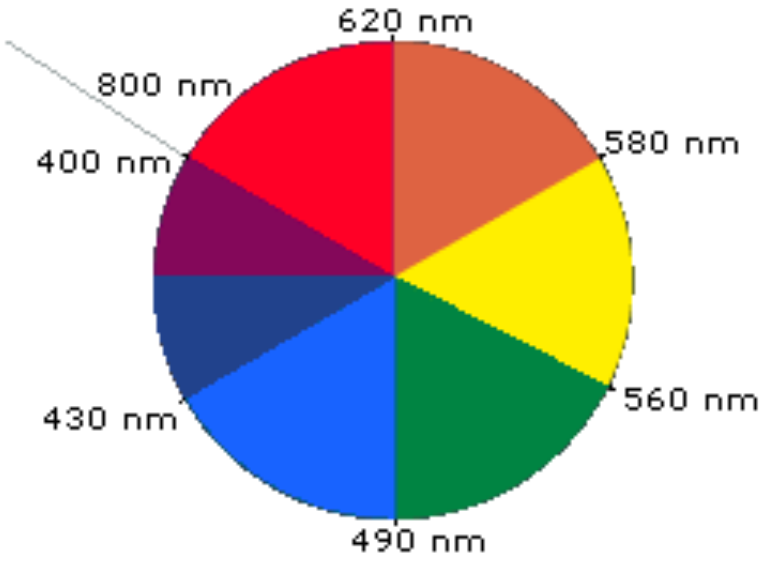
DiagnOx Laboratory

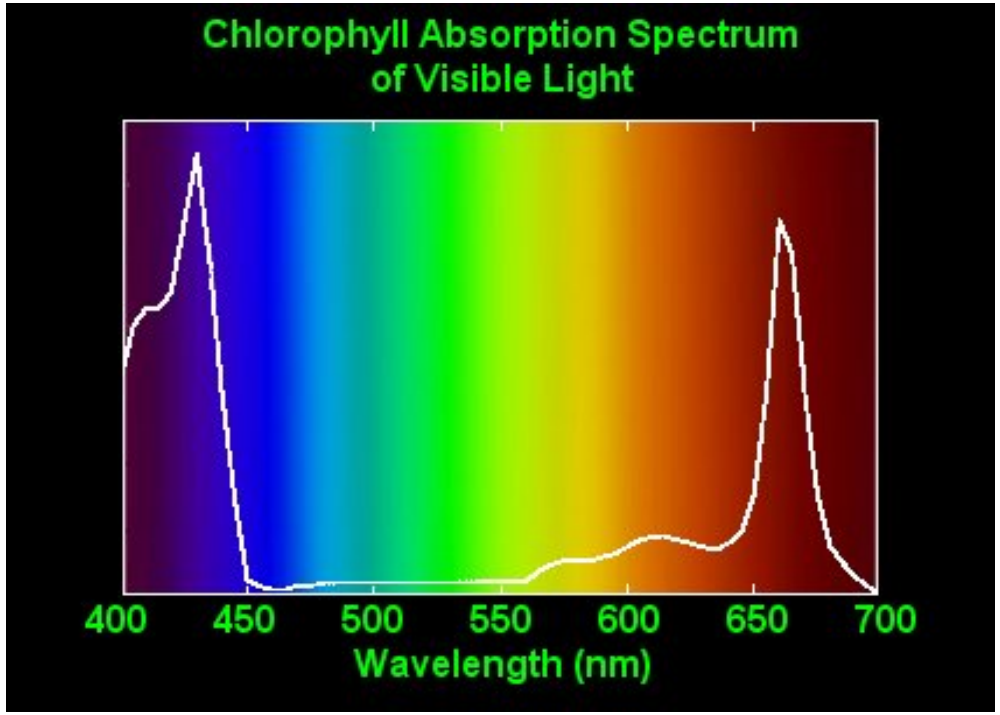
Shimadzu UV-2600 UV-VIS Spectrophotometer





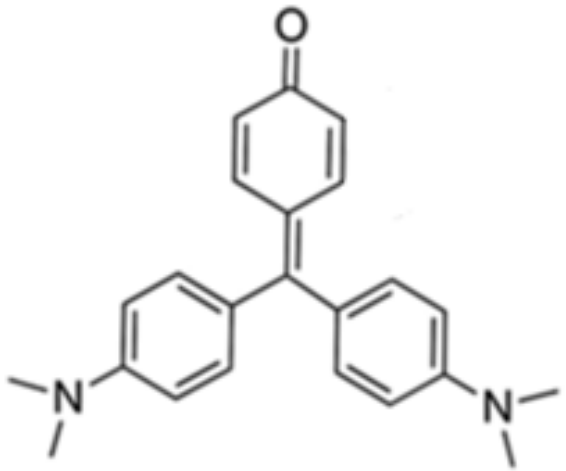
The colour of dyes and the corresponding light frequencies they absorb: chlorophyll as an example



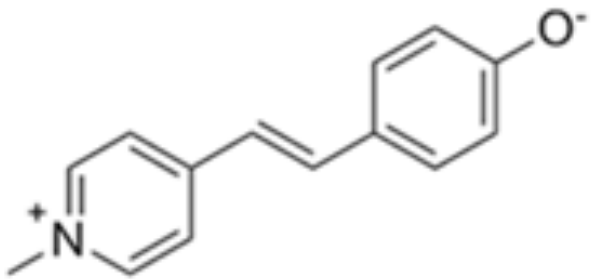


What is a Solvatochromic Dye?

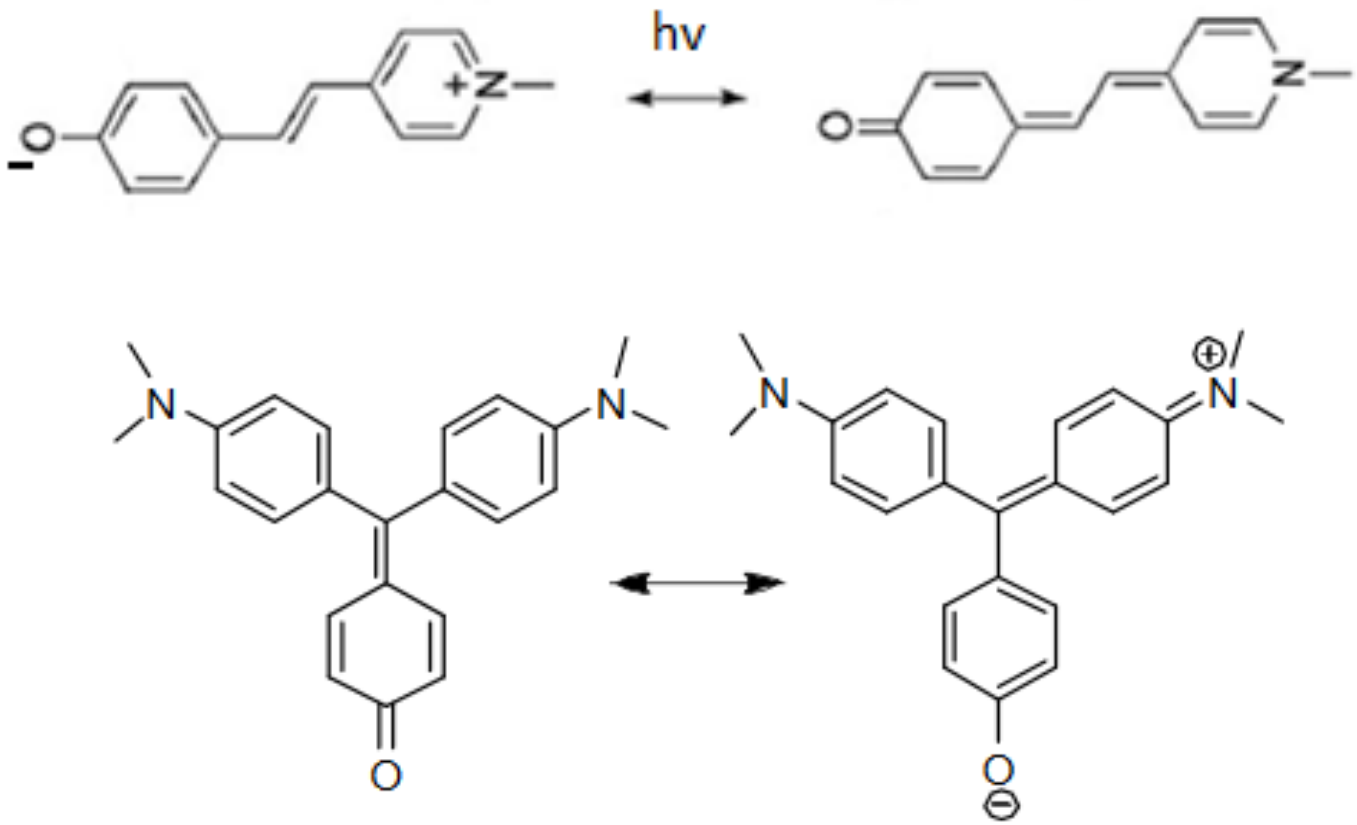
- A dye which is subject to intramolecular electron transfer (IET) on going from its ground (resting) state to an excited state as the result of interaction with photons.
- Solvatochromic dyes have the general form



BIS-DIMETHYLAMINO FUCHSONE
(BDF)
Positively solvatochromic dye)



BROOKER'S MEROCYANINE
(BM)
Negatively solvatochromic dye



GROUND STATE

EXCITED STATE

Why use solvatochromic dyes?

These dyes are very sensitive to environmental conditions e.g. solvent polarity, acid/base conditions, dye-dye interactions, electromagnetic fields

Solvatochromic dyes absorb in the visible region of the spectrum so they are highly coloured and their spectrum (colour) changes according to environmental conditions

Experimental protocol; materially equivalent solutions

Potency (90% ethanol)

30microlitres into 3ml of reverse osmosis water (100 fold dilution)

30microlitres into 3ml of reverse osmosis water (100 fold dilution) in HDPE bottle

50µl (60 fold dilution)

2.95ml of dye/20mM buffer solution

Incubation away from light

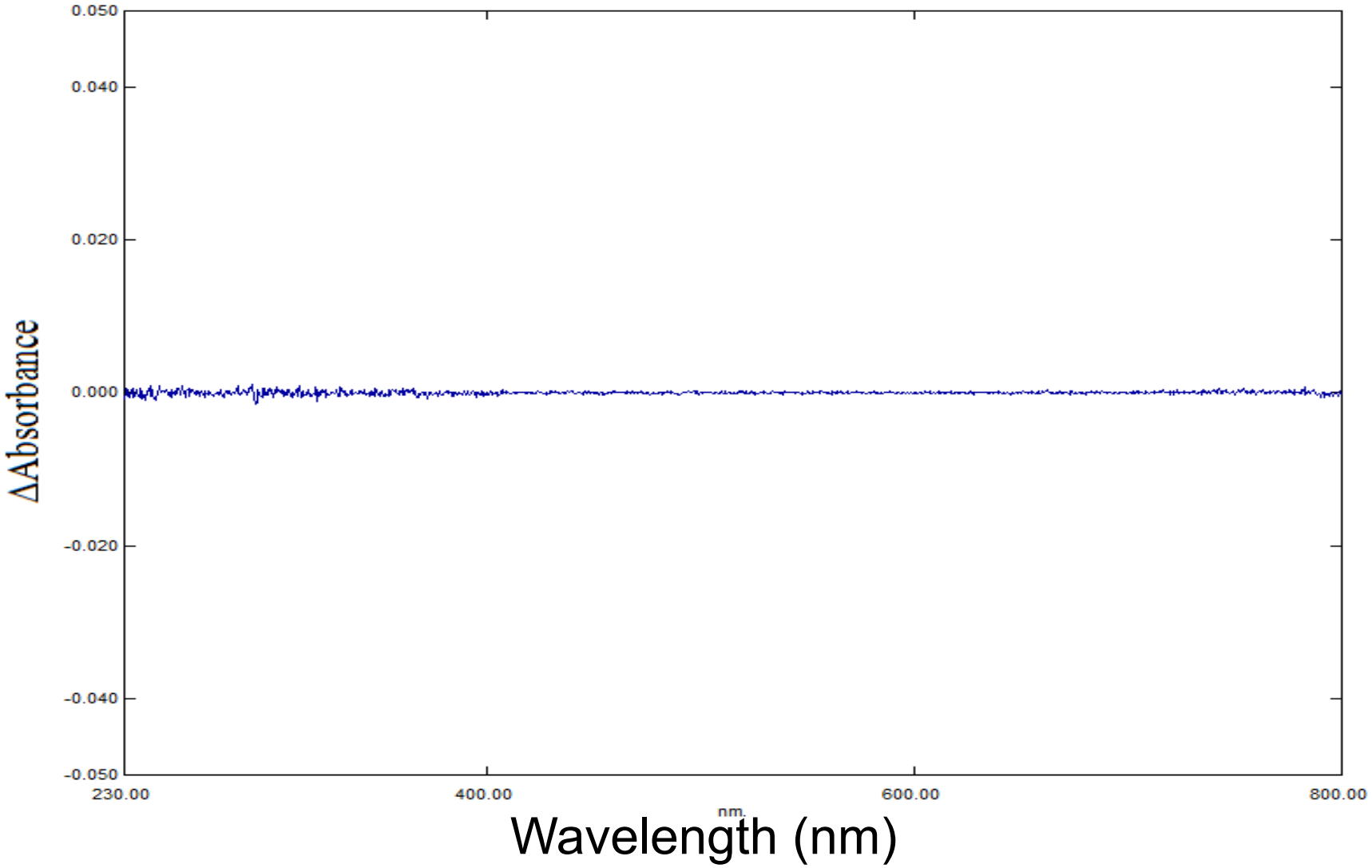
50µl (60 fold dilution)

30microlitres into 3ml of reverse osmosis water (100 fold dilution) in HDPE bottle

Control (90% ethanol)

30microlitres into 3ml of reverse osmosis water (100 fold dilution)

Expected difference spectrum for materially equivalent solutions



“We approached the case, you remember, with an absolutely blank mind, which is always an advantage. We had formed no theories. We were simply there to observe and to draw inferences from our observations”

Sherlock Holmes

“The Adventure of the Cardboard Box”

“It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts.”

-Sherlock Holmes

A Scandal in Bohemia

Homeopathy (2016) 105, 55–65

http://dx.doi.org/10.1016/j.homp.2015.08.002, available online at http://www.sciencedirect.com

ORIGINAL PAPER

Solvatochromic dyes detect the presence of homeopathic potencies

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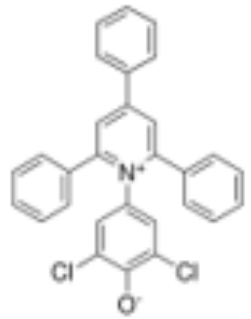
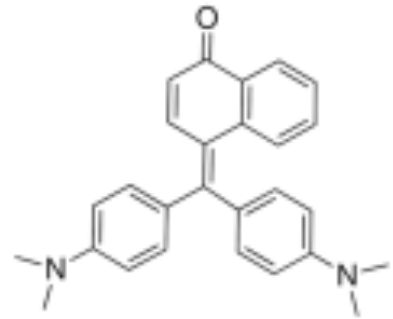
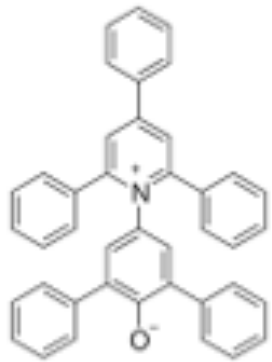


ET33

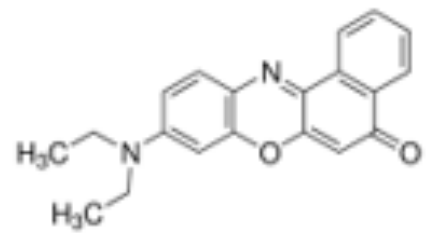


BDN

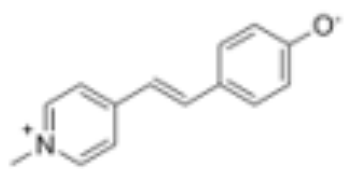
BDF



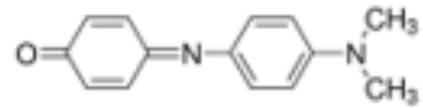
ET30



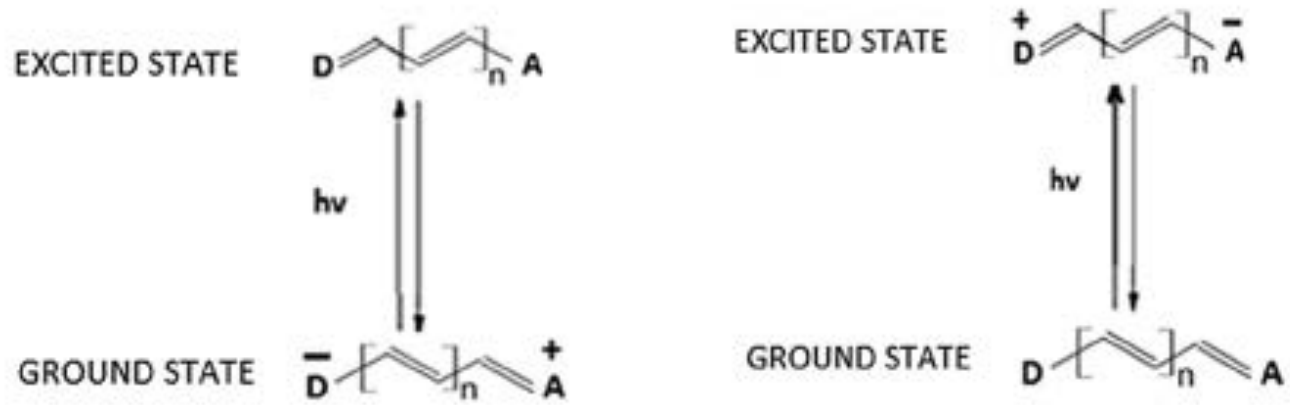
NR



BM



PB

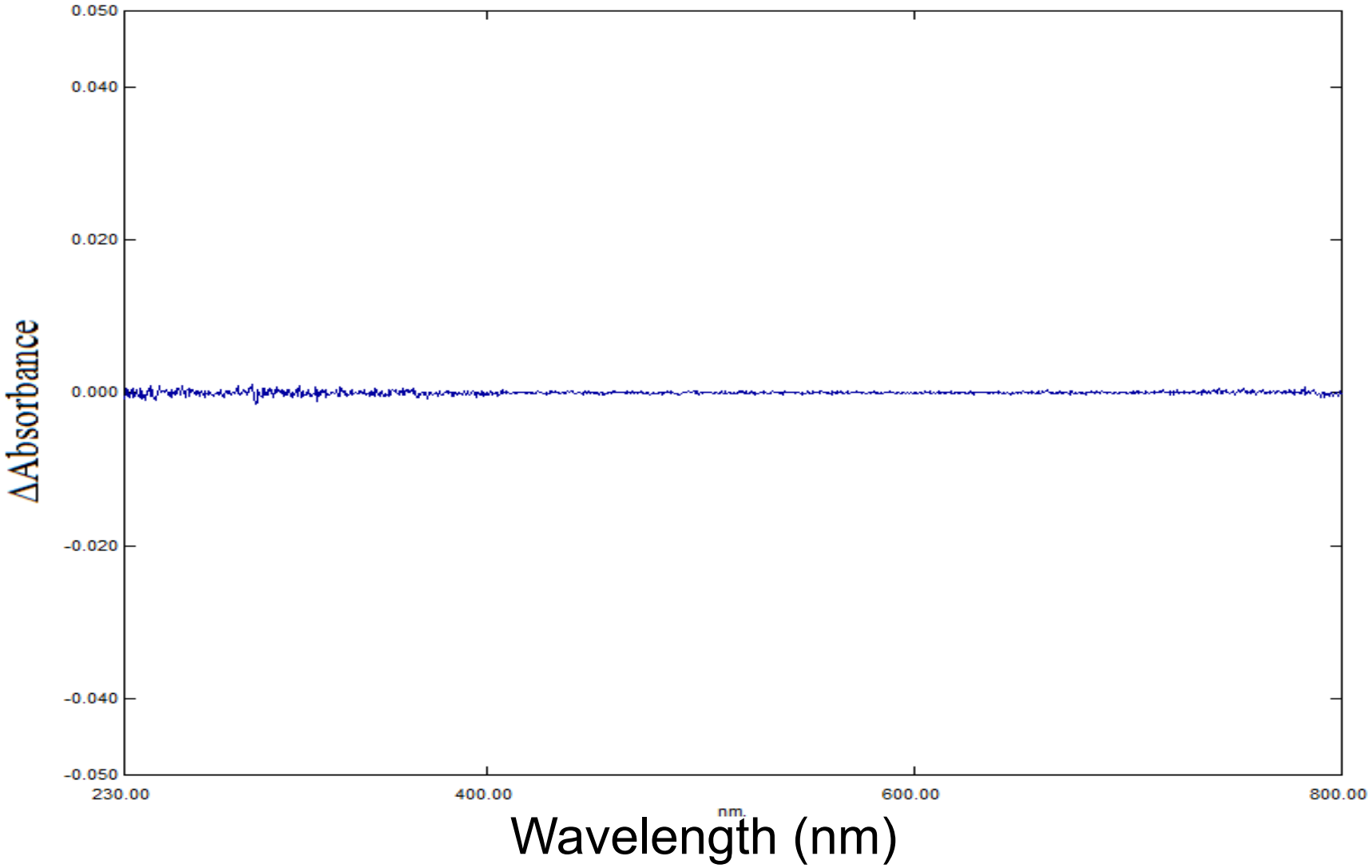


Negatively solvatochromic dyes

Positively solvatochromic dyes

Figure 2 Diagram showing the structure of ground and excited states in negatively and positively solvatochromic dyes. For the positively solvatochromic dyes used in this study electron donating groups (D) are of the form =N– and electron accepting groups (A) are of the form =C=O. For the negatively solvatochromic dyes used in this study electron donating groups are of the form $-O^-$ and acceptor groups are of the form $\equiv N^+-$. (see text for more details).

Expected difference spectrum for materially equivalent solutions



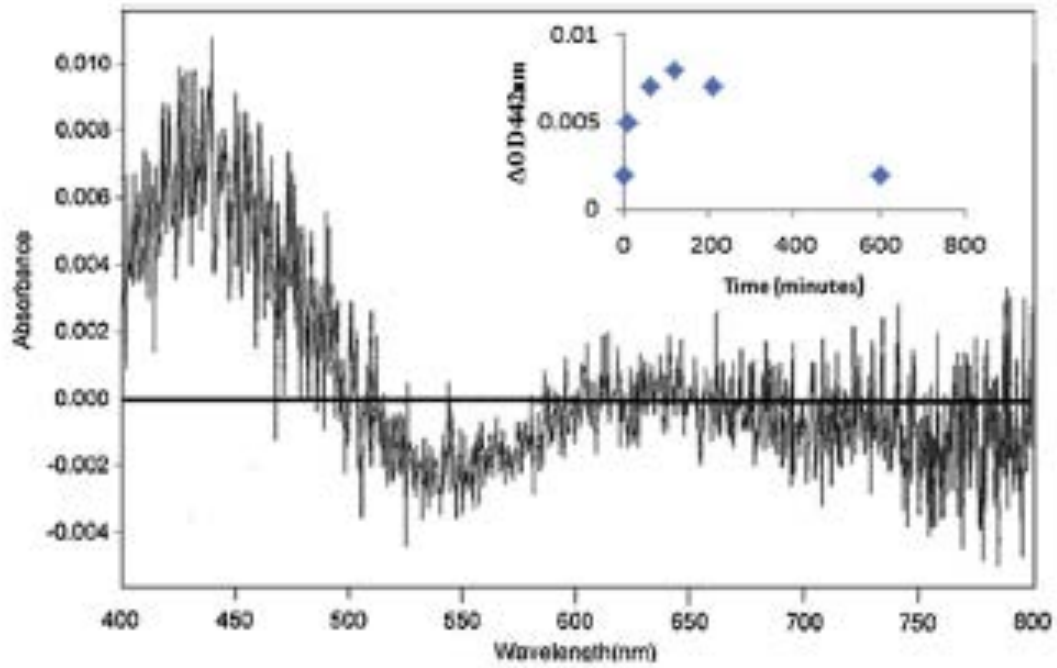


Figure 4 Difference spectrum of ET33 in ethanol with 50 μl of control added to the reference cuvette and 50 μl of glycerol 50 M added to the sample cuvette to make a total volume of 3 ml in each cuvette (see Materials and methods). ET33 is at a concentration of 245 μM. Difference spectrum consists of the sample spectrum minus the reference spectrum. Difference spectrum shown is that at t = 120 min after mixing. UV cuvettes used. Insert shows the change in ΔOD442 nm over time.

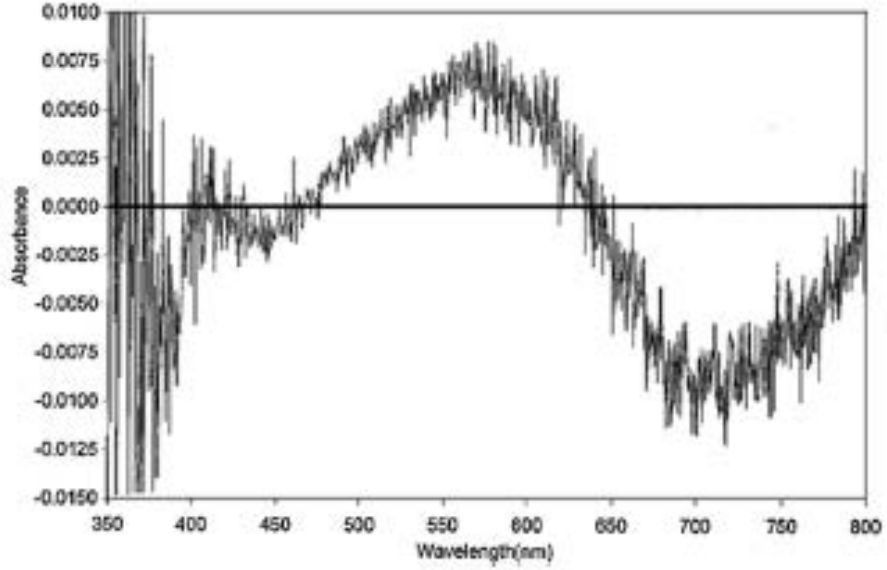


Figure 6 Difference spectrum of ET30 in *tert*-butyl alcohol with 50 μl of control added to the reference cuvette and 50 μl of glycerol 50 M added to the sample cuvette to make a total volume of 3 ml in each cuvette (see Materials and methods). ET30 is at a concentration of 245 μM. Difference spectrum consists of the sample spectrum minus the reference spectrum. Difference spectrum shown is that at t = 120 min after mixing. UV cuvettes used.

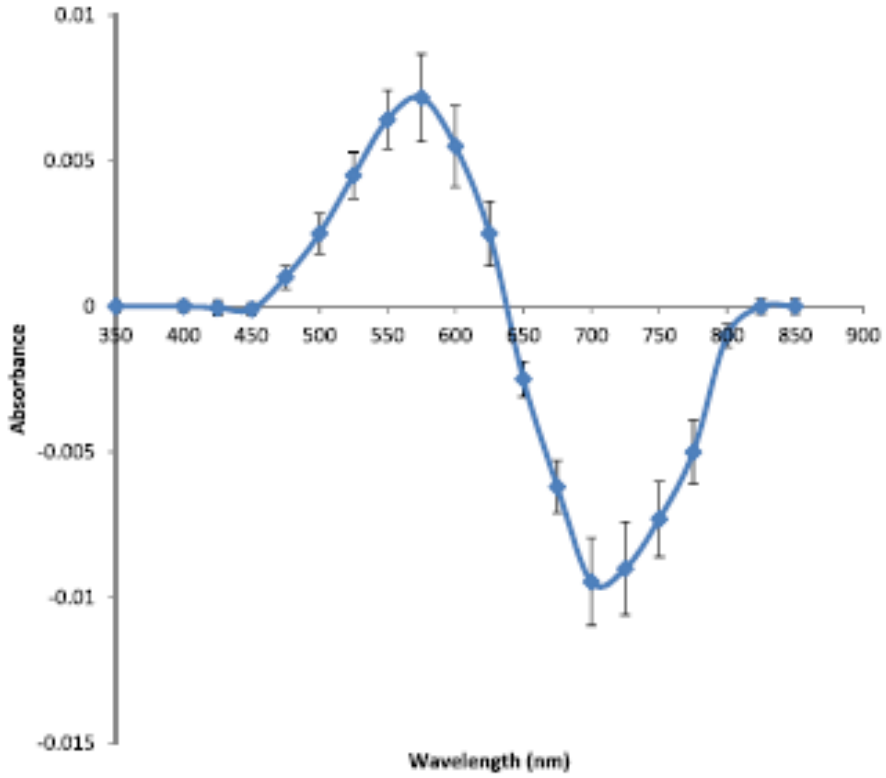


Figure 10 Combined difference spectra (n = 20) of ET30 in *tert*-butyl alcohol with 50 μl of control added to the reference cuvette and 50 μl of glycerol 50 M added to the sample cuvette to make a total volume of 3 ml in each cuvette (see Materials and methods). ET30 is at a concentration of 245 μM. Difference spectrum consists of the sample spectrum minus the reference spectrum. UV cuvettes used. Error bars are to the first standard deviation. Control 'difference' spectra (n = 20) where 50 μl of control are added to both cuvettes display no discernible difference across the spectrum from 350 to 800 nm (ie 0.000 $\pm$ 0.000) giving a p value of <0.0001, indicating high statistical significance.

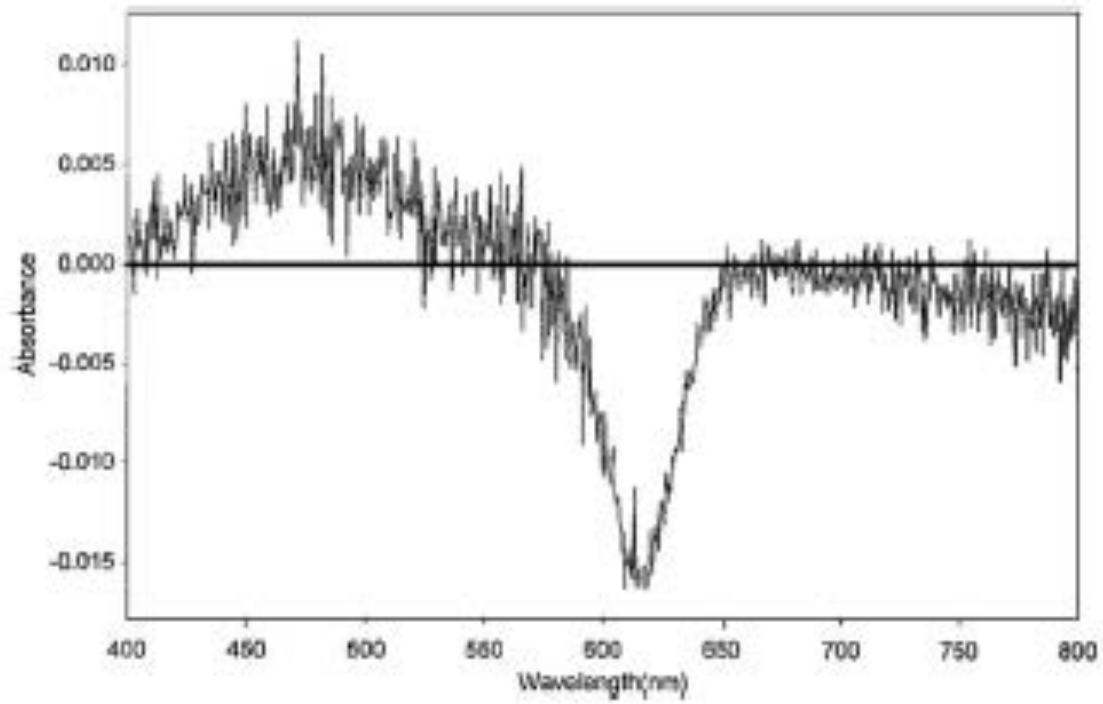


Figure 7 Difference spectrum of BDN in ethanol with 50 μl of control added to the reference cuvette and 50 μl of glycerol 50 M added to the sample cuvette to make a total volume of 3 ml in each cuvette (see Materials and methods). BDN is at a concentration of 80 μM. Difference spectrum consists of the sample spectrum minus the reference spectrum. Difference spectrum shown is that at t = 30 min after mixing. UV cuvettes used.

Conclusions

- Solvatochromic dyes respond to the presence of Glycerol 50M with changes in their UV-visible spectra.
- The use of three different solvents – water, ethanol and tertiary butyl alcohol indicate bulk water is not necessary for homeopathic action.
- The decreasing ability of these solvents to hydrogen bond in the sequence water > ethanol >> TBA suggests some other mechanism than water memory through H-bonding is at play.

How are potencies interacting with solvatochromic dyes to produce the changes seen and what does this tell us about the fundamental nature of potencies?

Homeopathy (2017) 106, 37–46

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ORIGINAL PAPER

Interaction of homeopathic potencies with the water soluble solvatochromic dye bis-dimethylaminofuchsone. Part 1: pH studies

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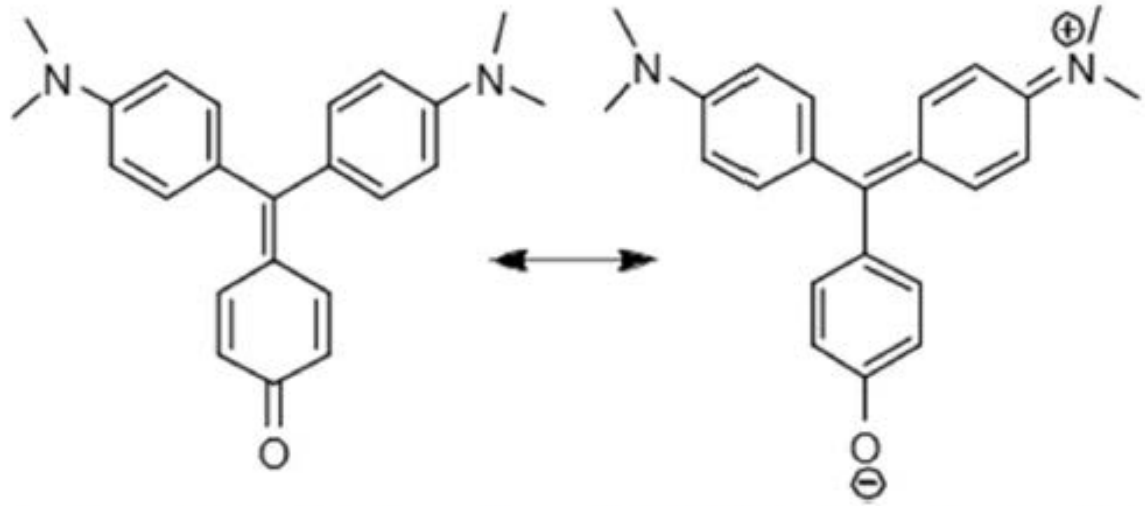

Figure 1 Chemical structure of BDF (4-[bis[4-(dimethylamino)phenyl]methylene]-2,5-Cyclohexadien-1-one) with ground (left) and excited states (right) shown.

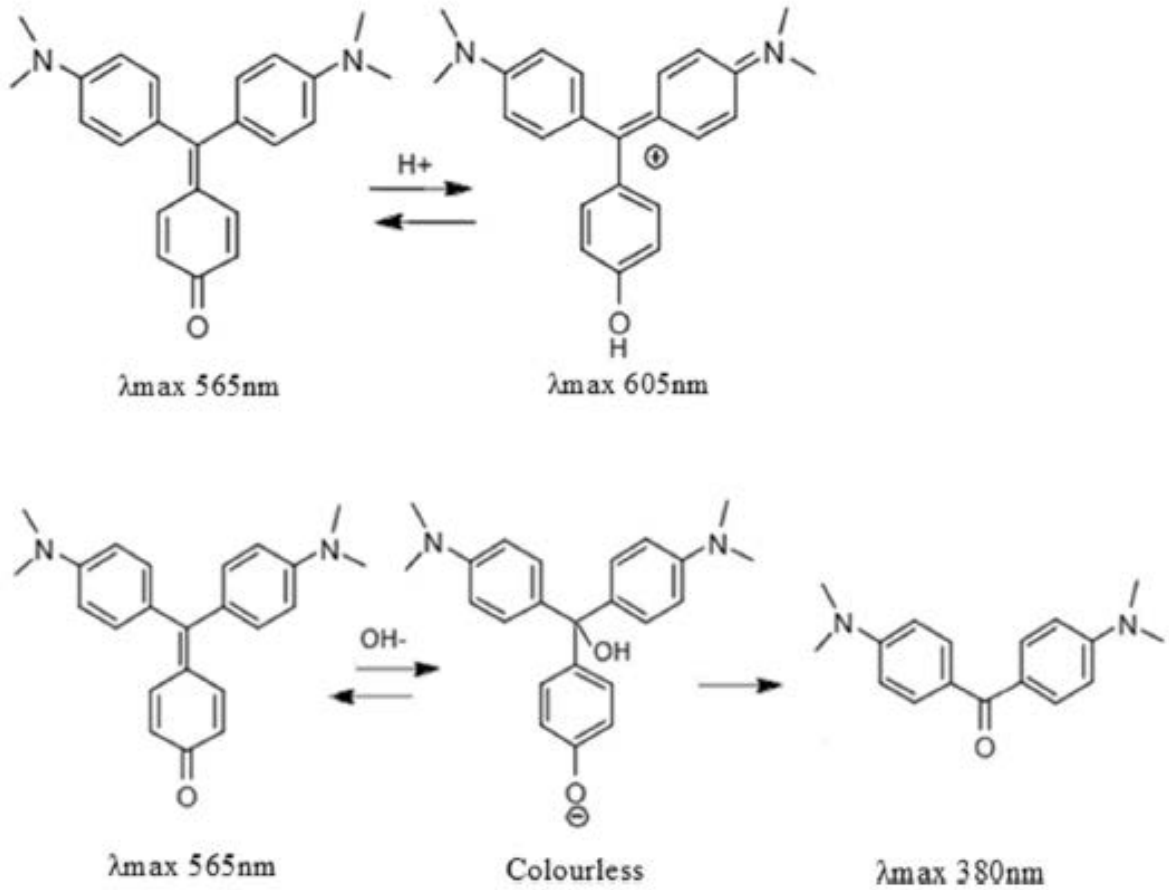

Figure 3 Chemistry of BDF showing the equilibrium between protonated and un-protonated BDF in acidic medium (above) and the more complex equilibrium and slow decomposition of BDF in basic medium (below).

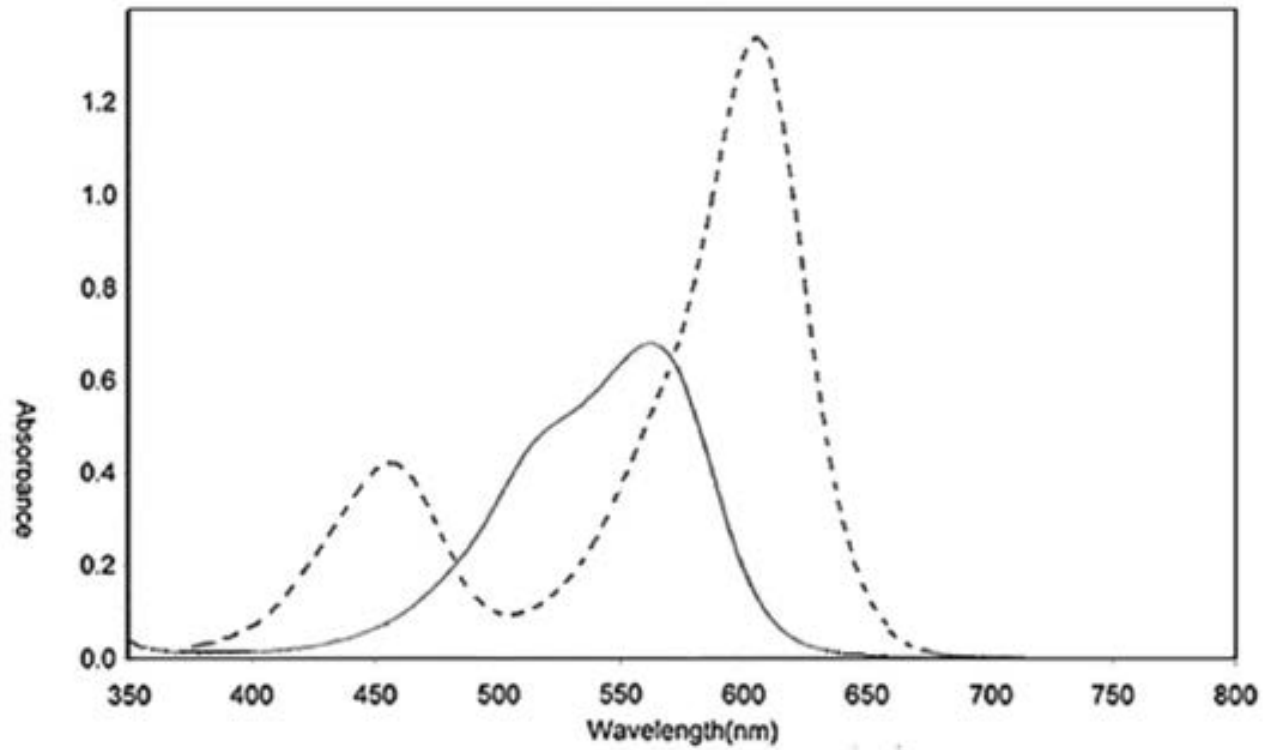

Figure 2 Spectrum of 15 μM BDF in 20 mM borate buffer pH10 (solid line). Spectrum of 15 μM BDF in 20 mM citrate buffer pH4 (broken line).

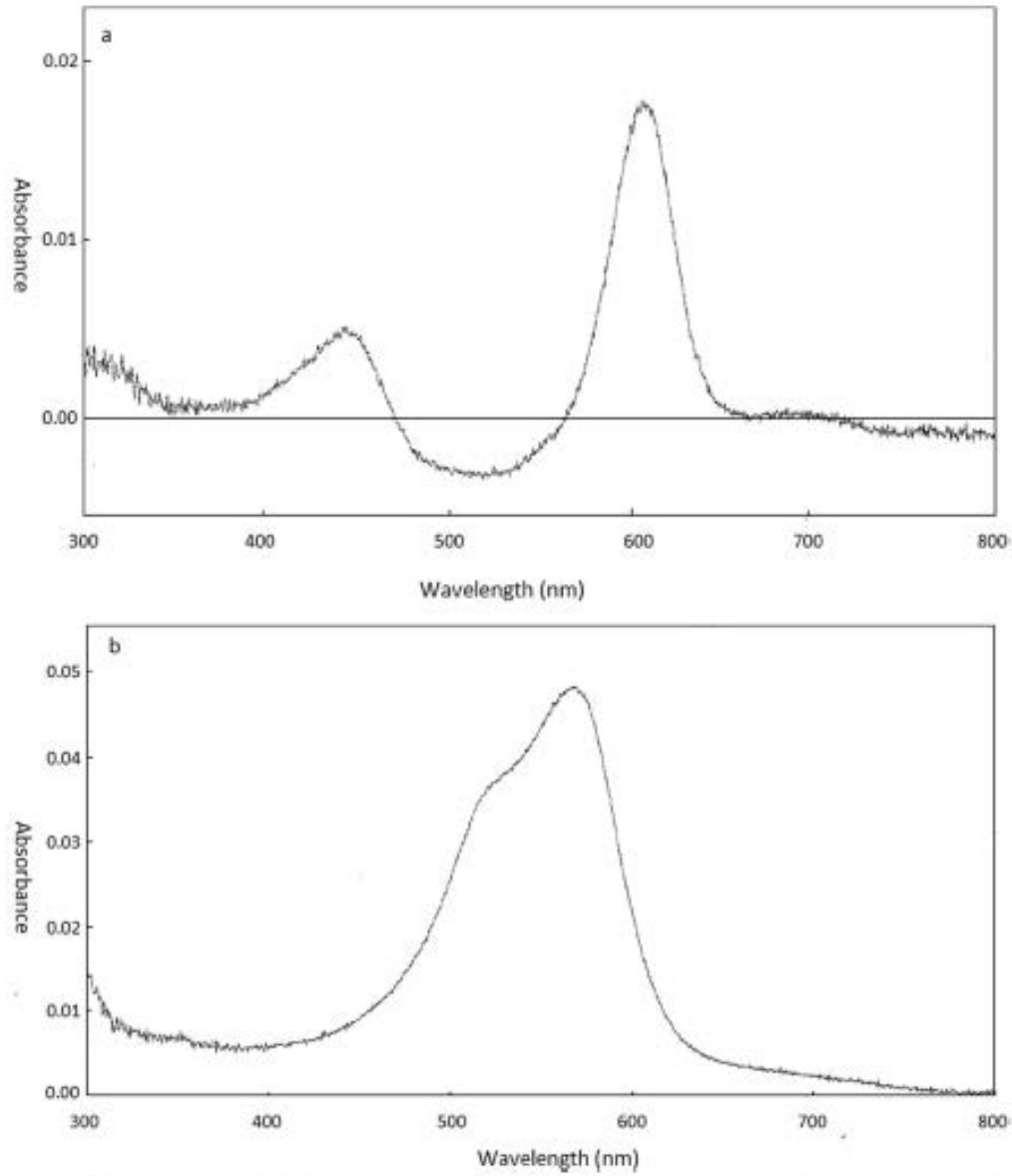

Figure 4 **a** (top). Difference spectrum of BDF in 20 mM citrate buffer pH 5.5 with control added to the reference cuvette and *Glycerol* 50M added to the sample cuvette (see Materials and methods). Difference spectrum consists of the sample spectrum minus the reference spectrum. Concentration of BDF is 15 μM; t = 12 h after mixing. **b** (bottom). Conditions as for (**a**) but BDF difference spectrum is in 20 mM borate buffer pH9; t = 12 h after mixing.

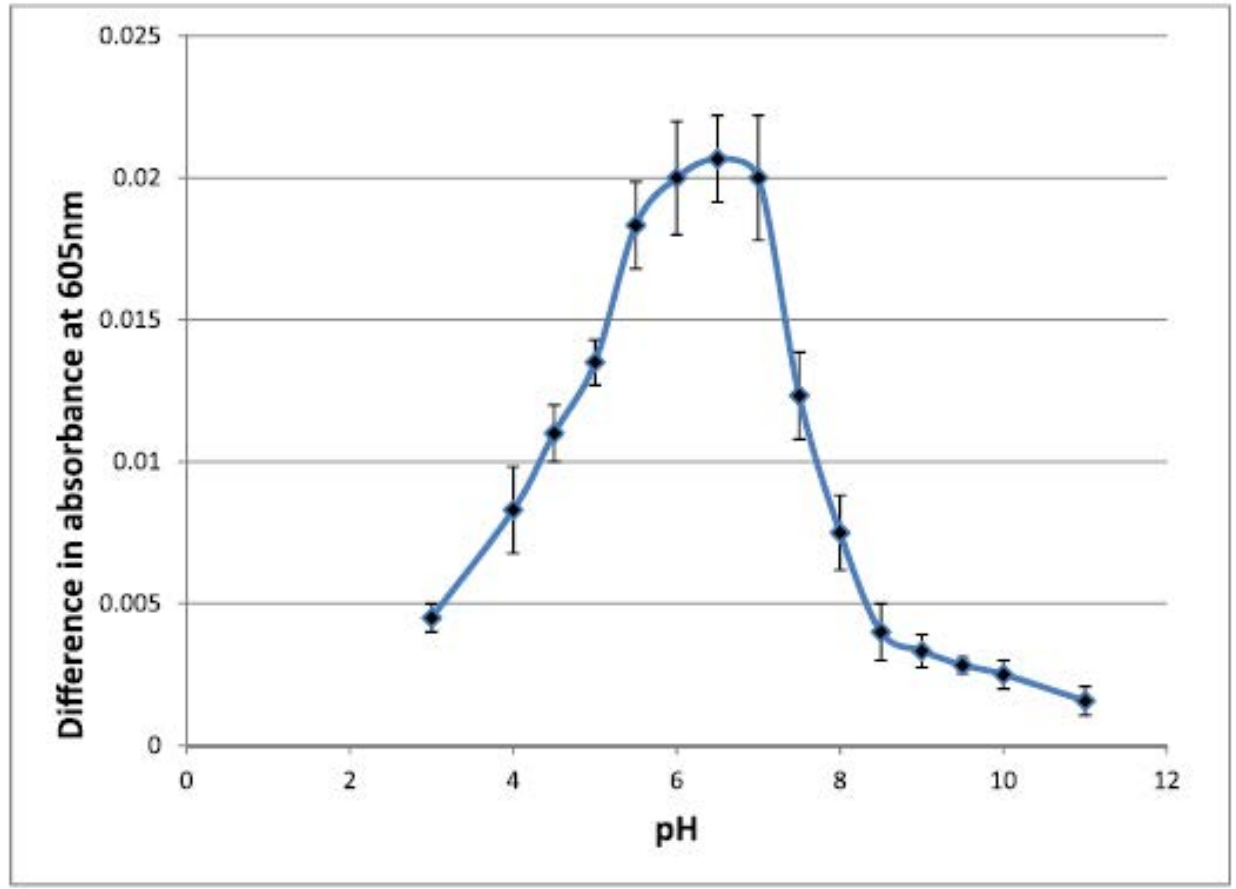

Figure 5 Difference in absorbance at 605 nm between control and *Glycerol* 50M solutions of BDF as a function of pH. BDF is at a concentration of 15 μM. Buffers (citrate pH 3–6; phosphate pH 6–8; borate pH 8–10; CAPS pH 10–11) are at a concentration of 20 mM (see Materials and methods). Difference absorbance is shown at t = 12 h; n = 5 for each pH value.

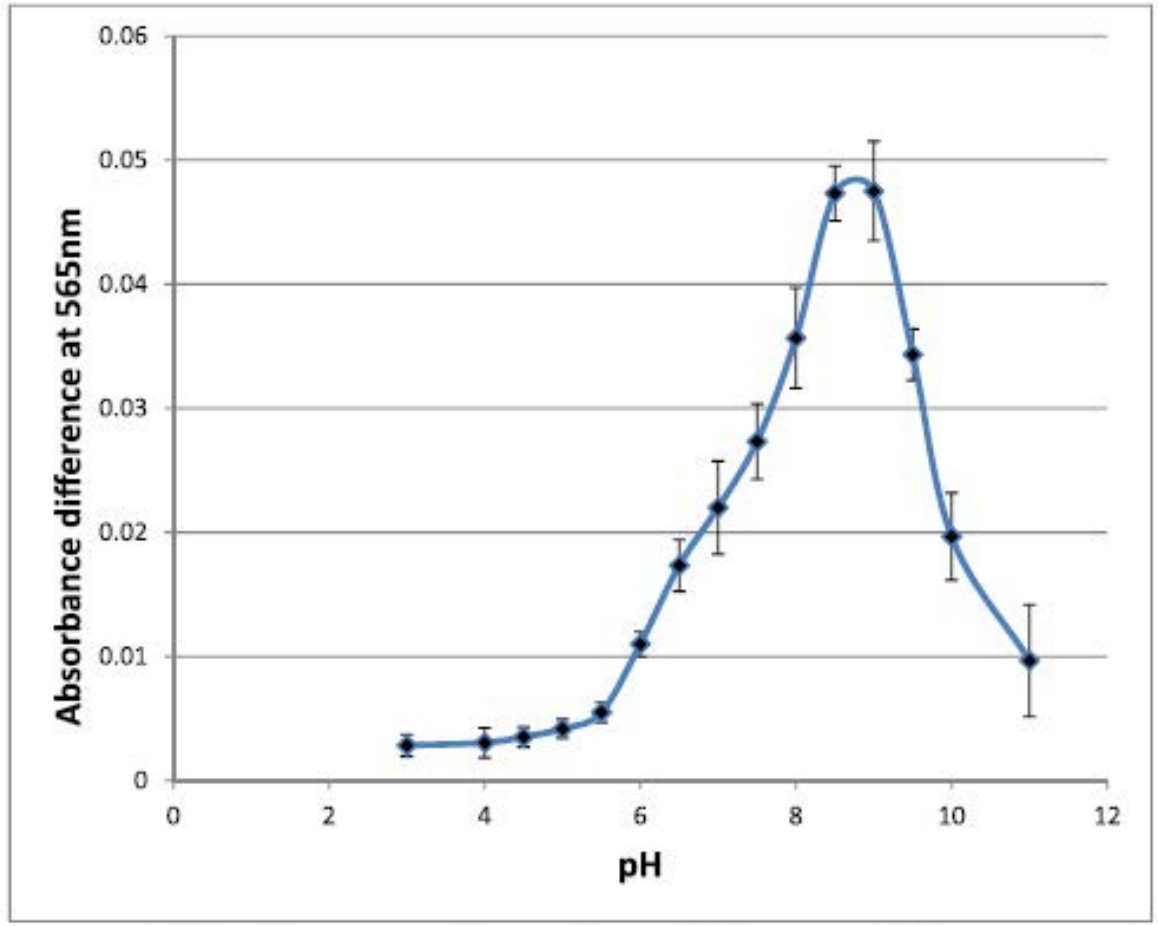

Figure 7 Difference in absorbance at 565 nm between control and *Glycerol* 50M solutions of BDF as a function of pH. BDF is at a concentration of 15 μM. Buffers (citrate pH 3–6; phosphate pH 6–8; borate pH 8–10; CAPS pH 10–11) are at a concentration of 20 mM (see Materials and methods). Difference absorbance is shown at t = 12 h; n = 5 for each pH value.

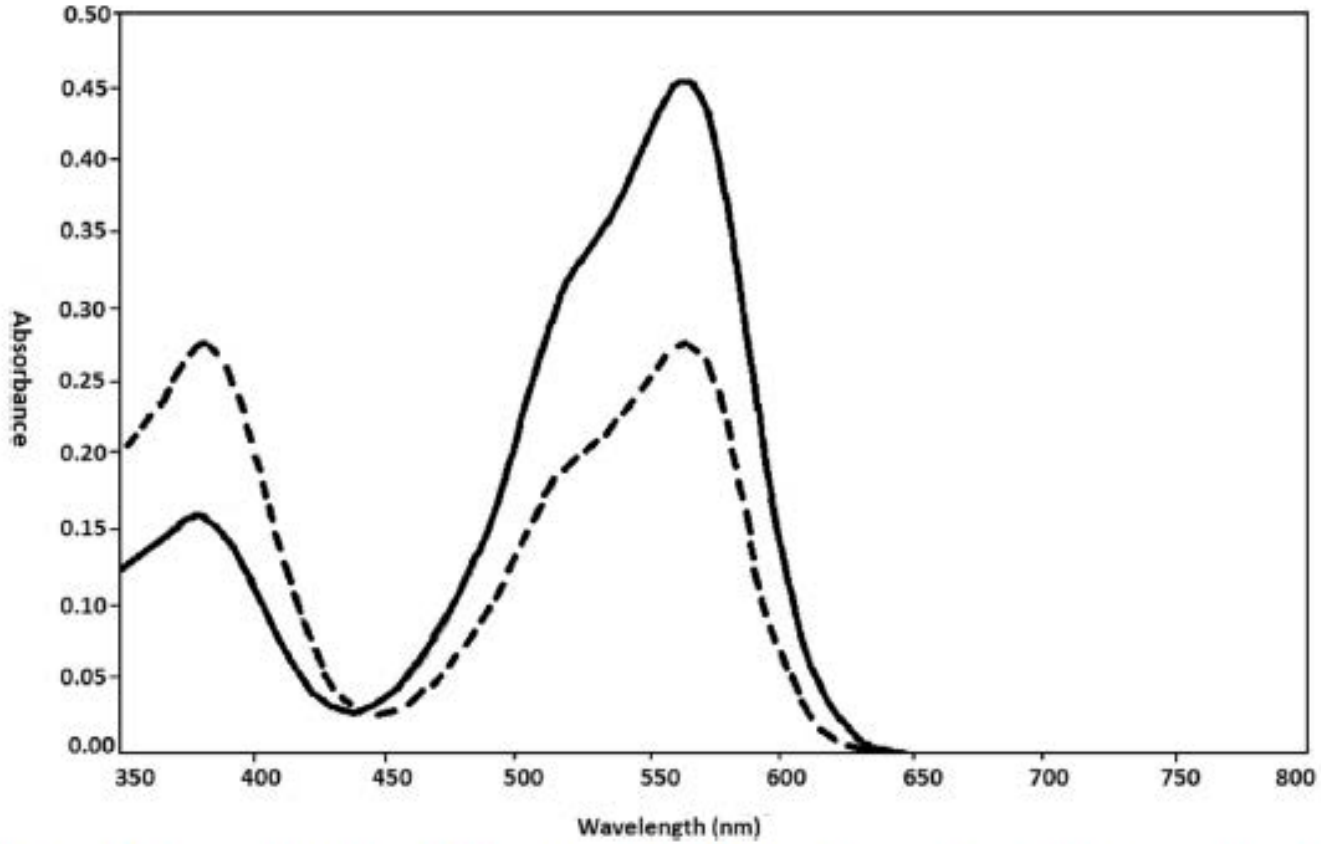

Figure 6 Scan of BDF at 15 μM concentration in 20 mM borate buffer pH 10 incubated with control solution (broken line). t = 10 days. Scan of BDF at 15 μM concentration in 20 mM borate buffer pH 10 incubated with *Glycerol* 50M solution (solid line). t = 10 days. Control-dye and *Glycerol* 50M-dye solutions were started at the same time and kept under identical conditions. (See 'Materials and methods' and text for details).

BDF with potency (left) and control (right) added. Both 20mM Borate buffer pH10

Conclusions

- pH plots indicate that both the central carbon atom in BDF and the dye's carbonyl oxygen acquire increased electron density in the presence of Glycerol 50M, resulting in an upward shift in pKa in both cases. Only the two dimethylamino groups of BDF could provide the electron density necessary for this to occur and indicates partial electron movement from the dimethylamino groups towards the dye's carbonyl oxygen.
- The implication arising from these results is that potency is partially stabilising some form of BDF which is electronically similar to its excited state.
- **In other words potency is promoting electron density movement across BDF to make it more polar**. This could result from some kind of resonant interaction or coupling between potency and BDF.

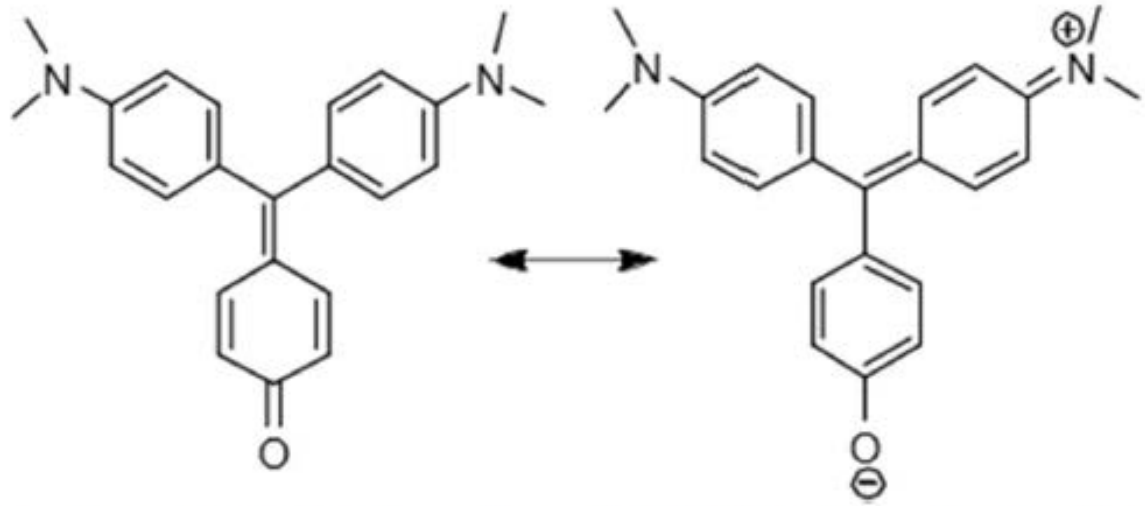

Figure 1 Chemical structure of BDF (4-[bis[4-(dimethylamino)phenyl]methylene]-2,5-Cyclohexadien-1-one) with ground (left) and excited states (right) shown.

How large is the range of dyes that can interact with potencies and can such a study show us what mechanisms might be operating in the clinical action of potencies?

In other words can we begin to answer the question “How do homeopathic remedies work?”

Degree of Response to Homeopathic Potencies Correlates with Dipole Moment Size in Molecular Detectors: Implications for Understanding the Fundamental Nature of Serially Diluted and Succussed Solutions

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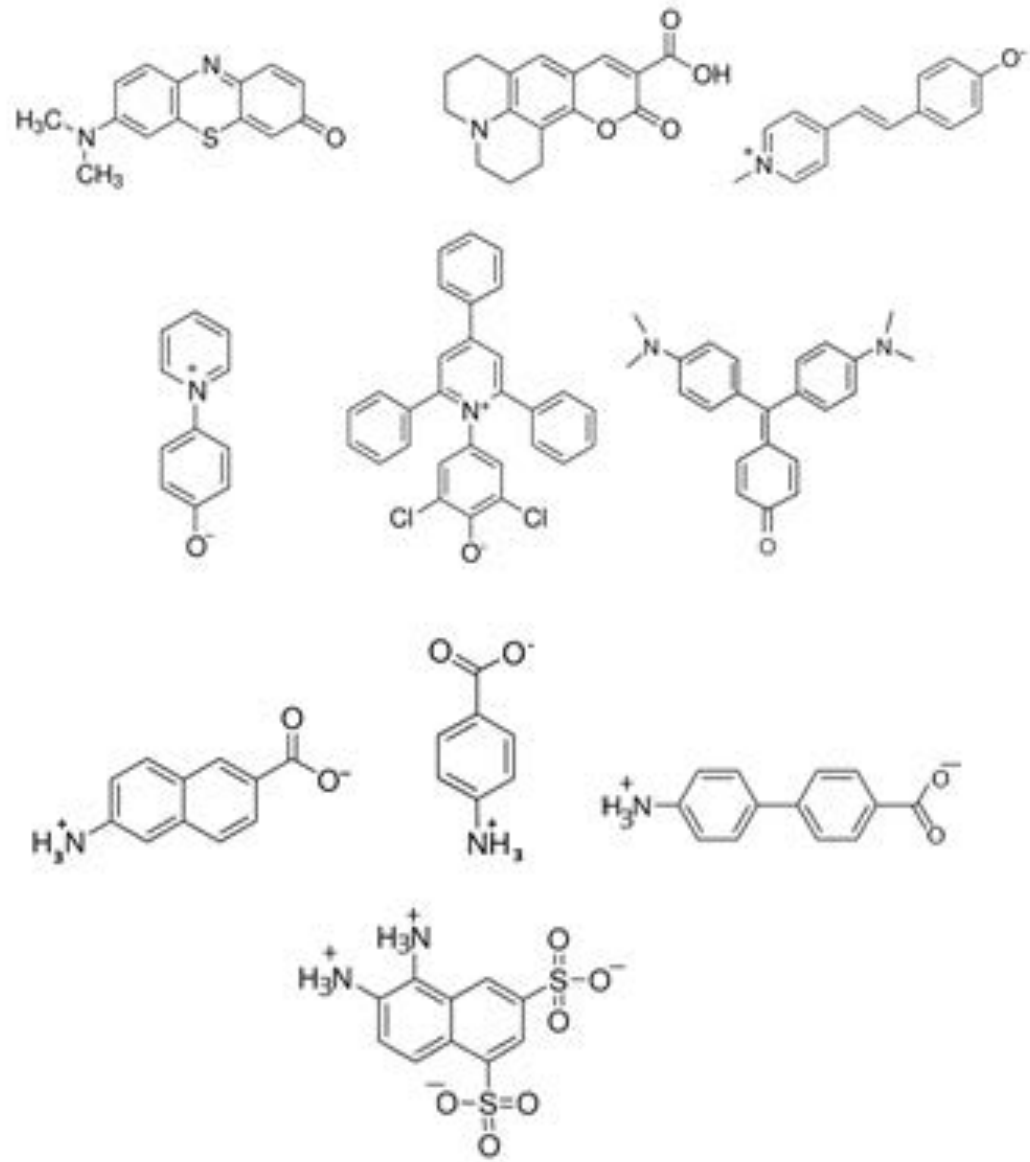
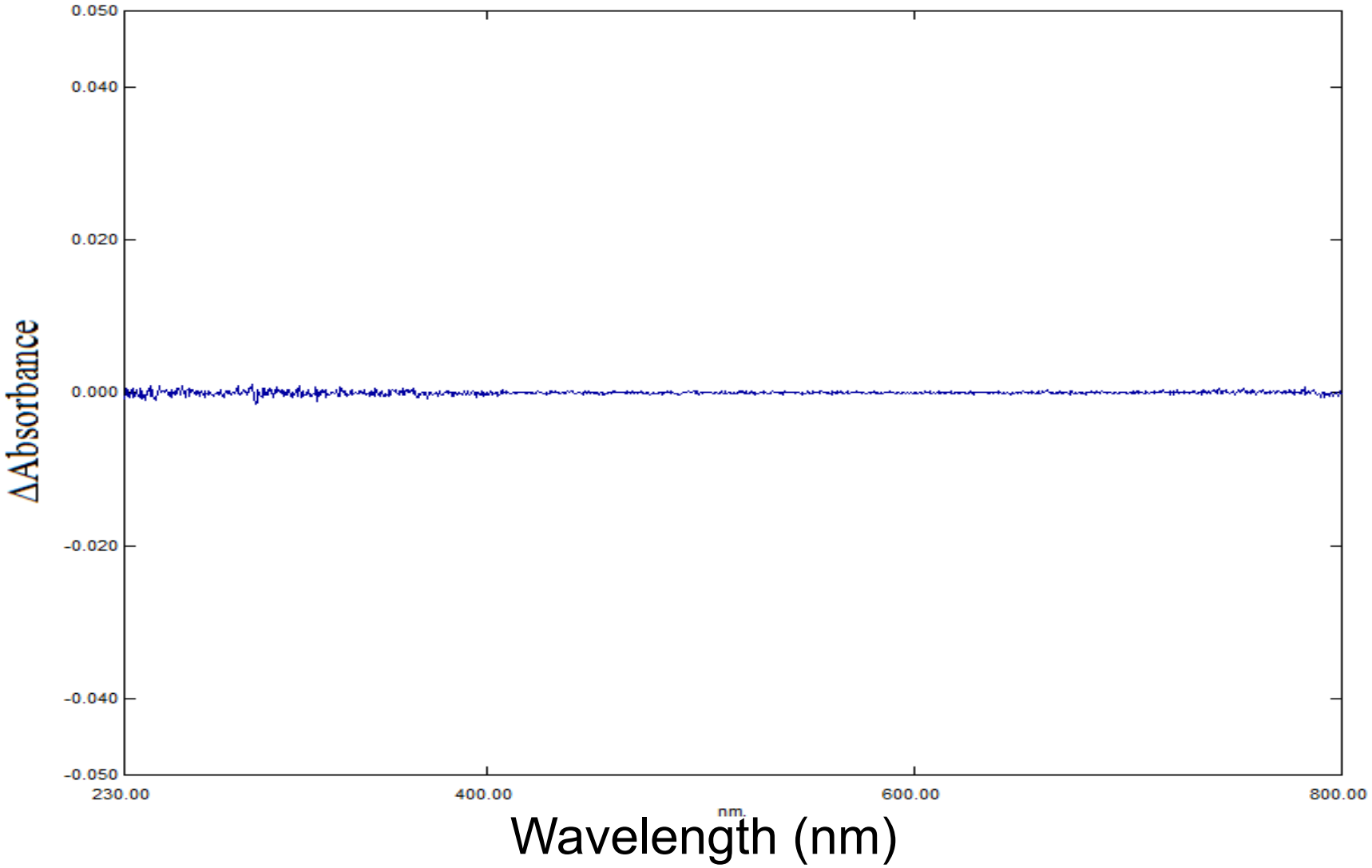
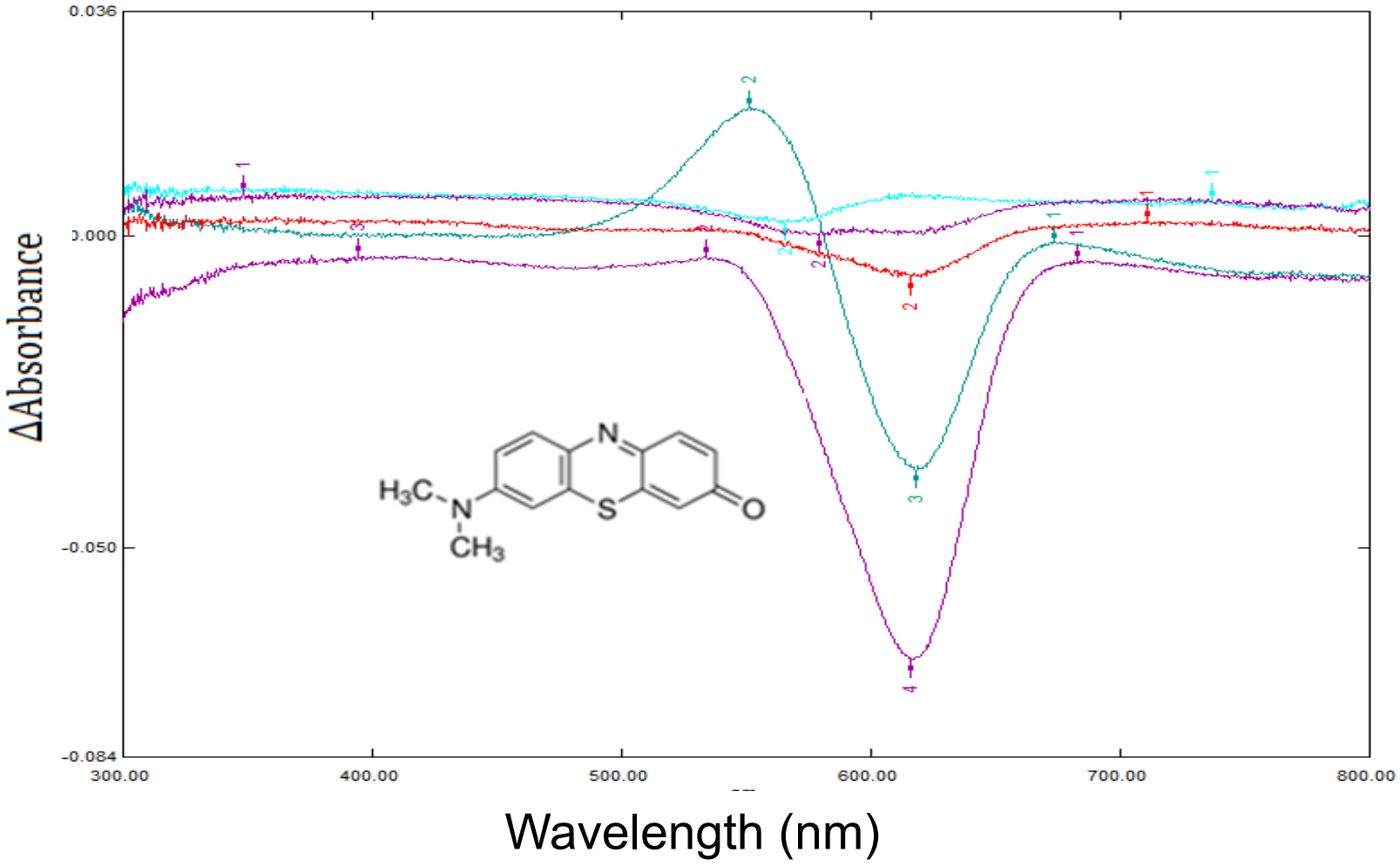


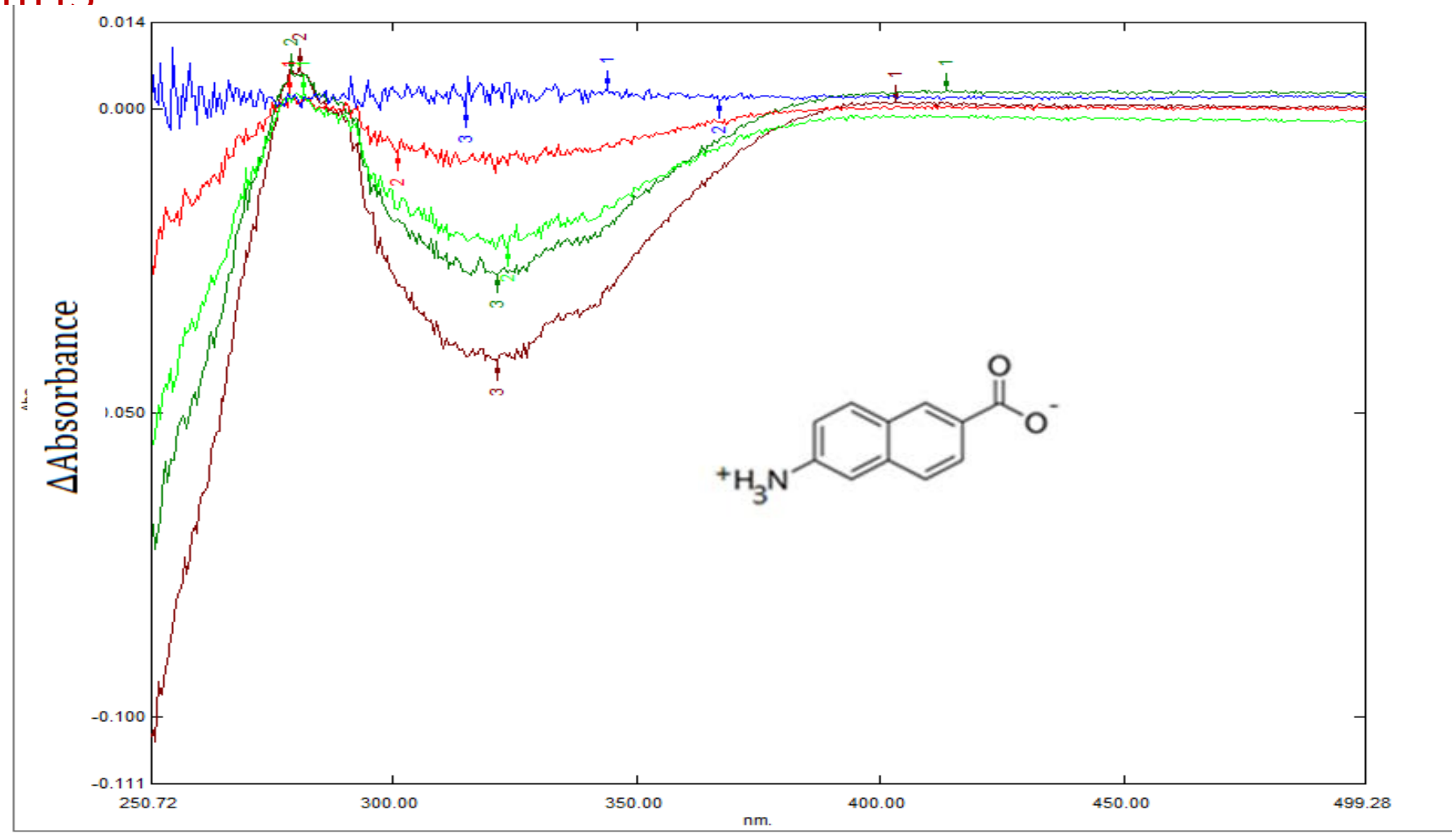
Expected difference spectrum for materially equivalent solutions



Difference spectra of Methylene Violet (MV) +/- potency; 20mM sodium phosphate pH7.5; t=0,10,100 mins; 12hours; 11days.

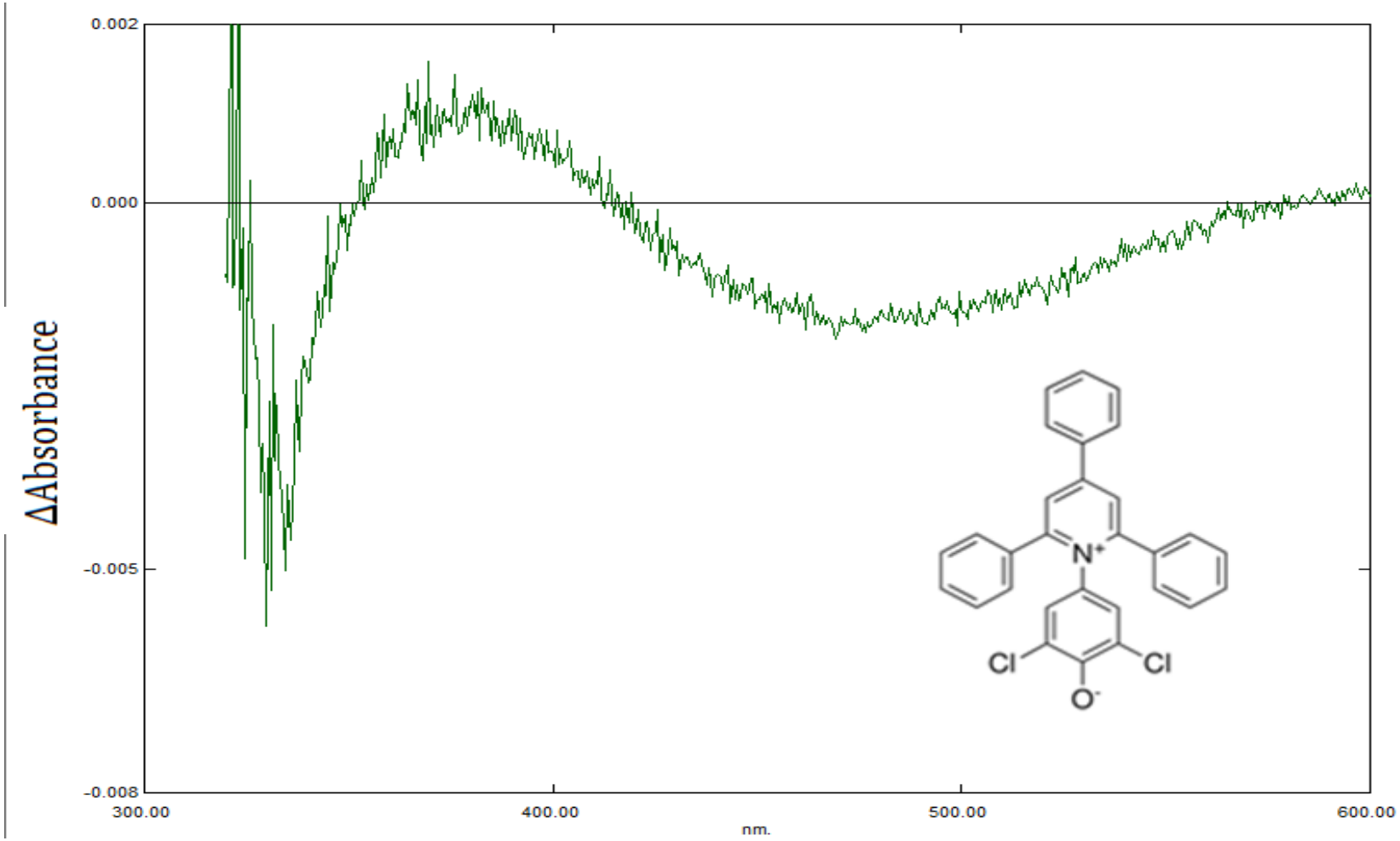


Difference spectra of 6-aminonaphthoic acid (6ANA) +/- potency; 20mM sodium citrate pH3.5; t=0, 10, 40, 100, 200mins



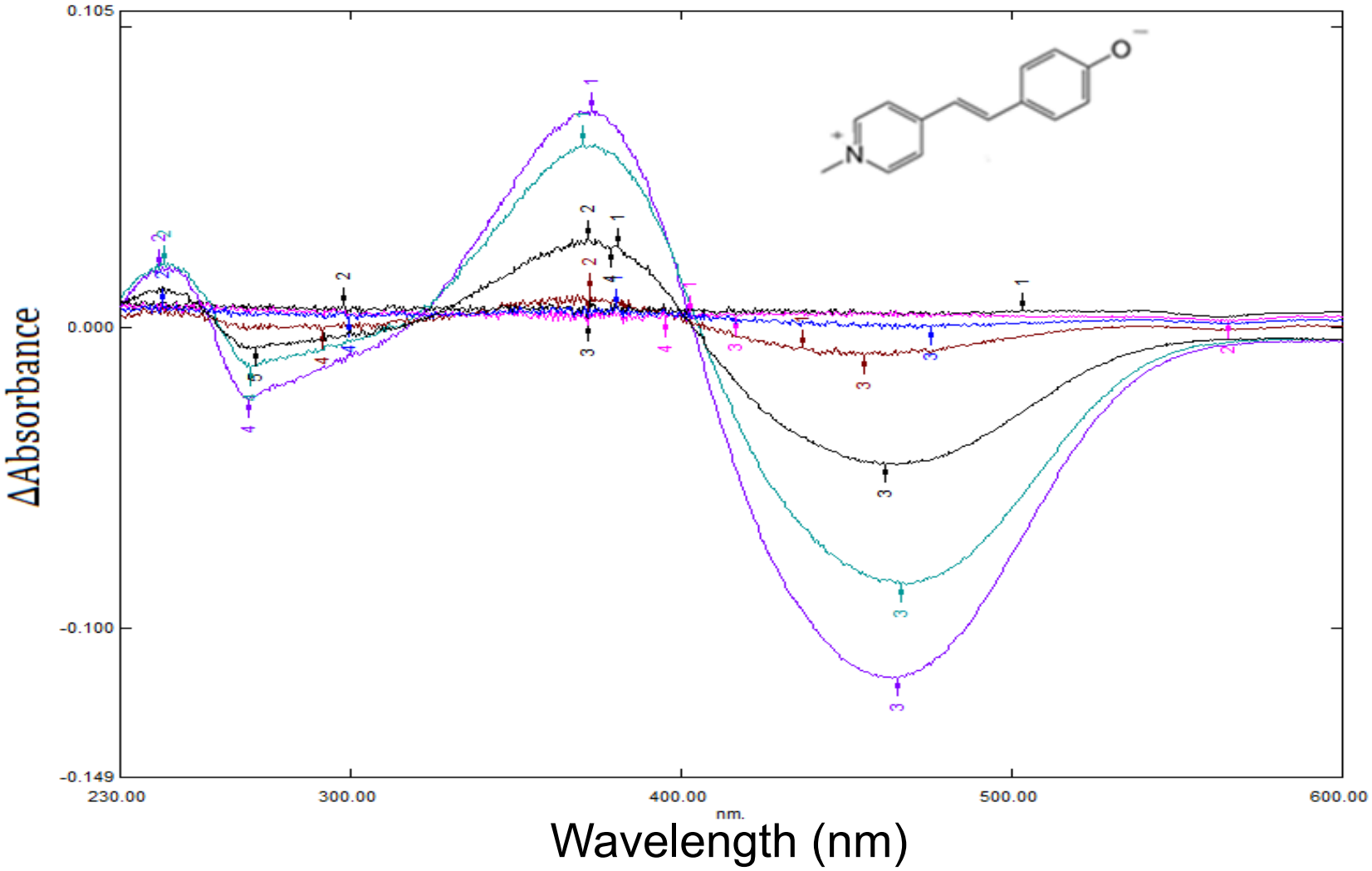
Wavelength (nm)

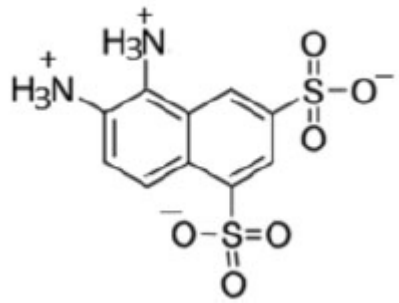
Difference spectrum of ET33 +/- potency; 20mM sodium borate pH8.5; t= 200min.



Wavelength (nm)

Difference spectra of Brooker's merocyanine (BM) +/- potency; 20mM sodium borate pH8.5; t=0, 10, 40, 200min; 12 hours; 14days. Dye encapsulation with beta-cyclodextrin





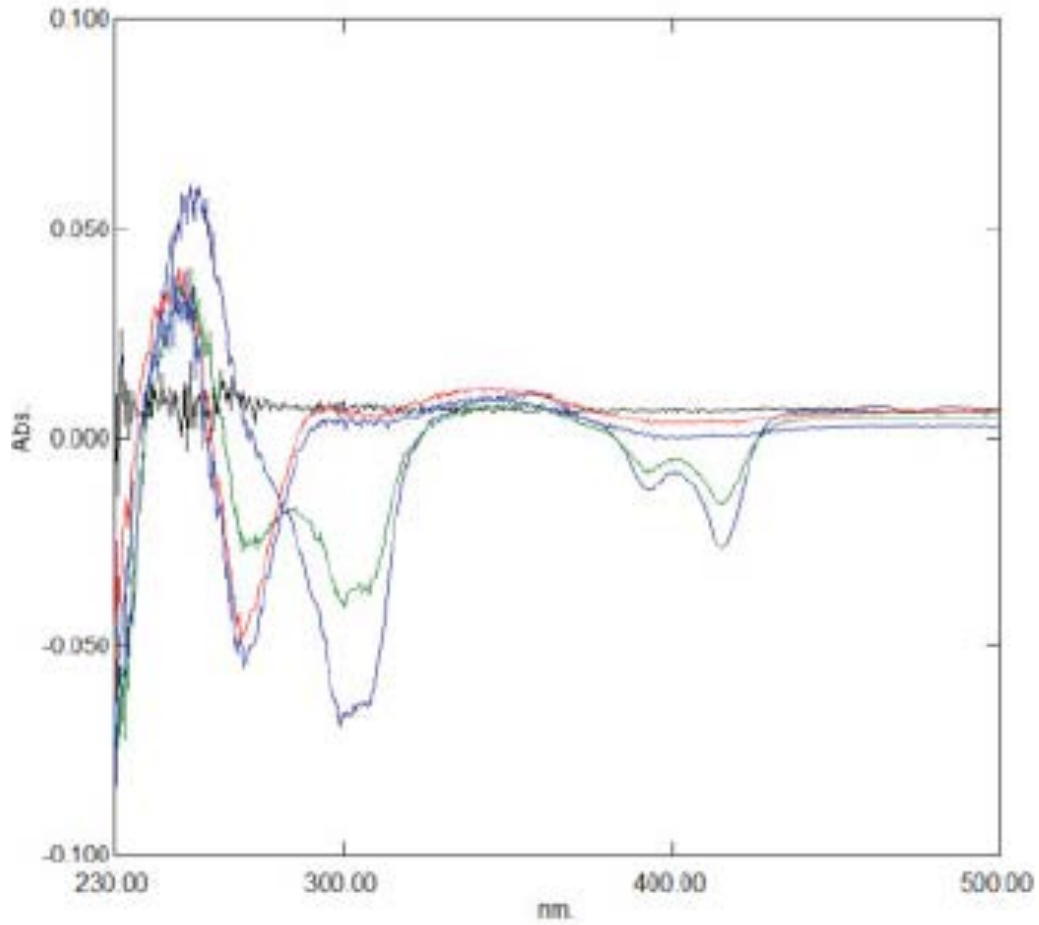


Fig. 8 Difference spectrum of 70 μM DANDSA in 20 mM citrate buffer pH 4.0 with control added to the reference cuvette and *Glycerol* 50 M added to the sample cuvette. Spectra correspond to $t = 0$, $t = 100$ minutes, $t = 220$ minutes, $t = 7$ days and $t = 18$ days after mixing (see text for details). DANDSA, 5, 6-diamino-naphthalene-1, 3-disulfonic acid.

COMPOUNDS SENSITIVE TO POTENCIES

π- conjugated-dipoles

π- conjugated-dipolar ions (zwitterions)

- Negatively solvatochromic dyes
- π- conjugated-amino acids

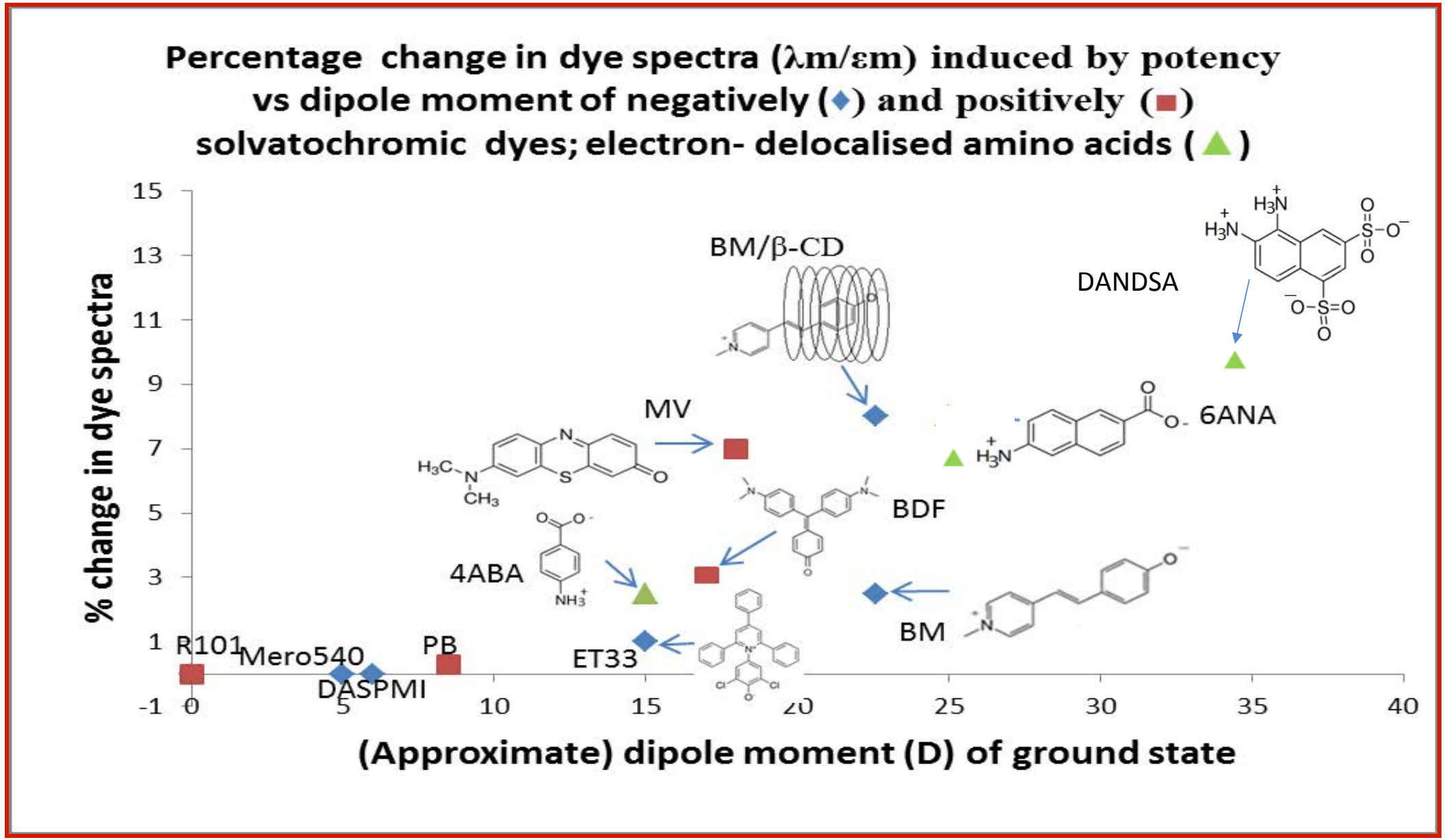
π- conjugated non-ionic dipoles

- Positively solvatochromic dyes

What do these results mean?

Examination of spectral changes induced in dyes examined so far indicate that -

In all cases dyes become *more* polar in the presence of potencies, and that *the higher the dipole moment of a dye the greater the degree of potency-induced polarisation.*


Percentage change in dye spectra (λm/εm) induced by potency vs dipole moment of negatively (♦) and positively (■) solvatochromic dyes; electron- delocalised amino acids (▲)
% change in dye spectra
15
13
11
9
7
5
3
1
-1
0
5
10
15
20
25
30
35
40
(Approximate) dipole moment (D) of ground state
BM/β-CD
DANDSA
MV
6ANA
BDF
4ABA
BM
ET33
R101
Mero540
DASPMI
PB

Three steps in the interaction of homeopathic potencies with solvatochromic dyes

Primary step: initial dye-potency interaction (results in an electron density shift)

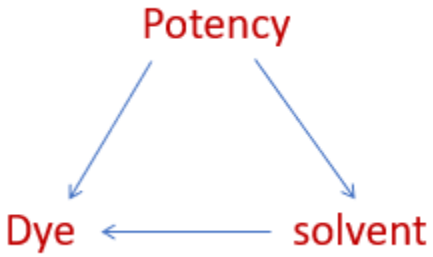
Secondary step: (dye pKa changes)

Tertiary step: dye aggregation equilibria altered

Conclusions

- A wide range of solvatochromic dyes and related compounds (π-conjugated dipoles) respond to Glycerol 50M
- The degree of response to potency correlates with the strength of electric charge across the detecting compound, together with molecular rigidity, suggesting compounds that detect potencies act as a kind of electromagnetic antennae resonating with Glycerol 50M.
- Three steps in the interaction of Glycerol 50M with π-conjugated dipoles can be discerned. There is an initial electron density shift followed by a change in the ability of molecular detectors to take up or lose a proton. The third step results in changes in dye aggregation patterns.

- Is it possible to separate out the three steps and in particular look at the primary potency-detector interaction?
- Are potencies acting directly on dyes or through the intermediary of solvent i.e. water?



Homeopathic Potencies May Possess an Electric Field(-like) Component: Evidence from the Use of Encapsulated Solvatochromic Dyes

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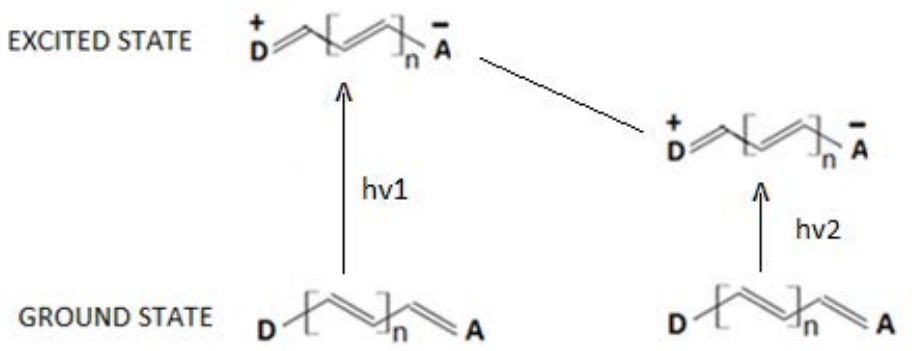
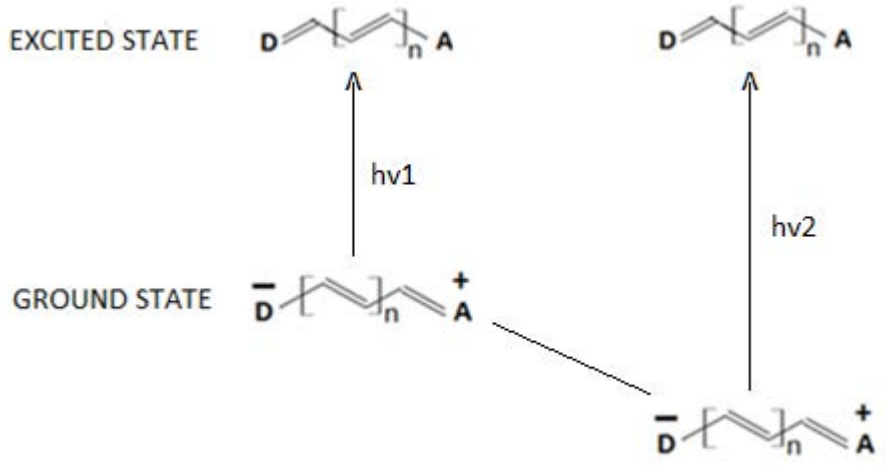
(e-mail: steven.cartwright@oxford-homeopathy.org.uk).

Positively solvatochromic dyes



Negatively solvatochromic dyes

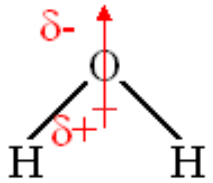


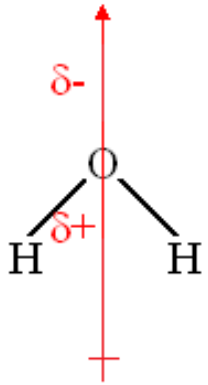
Positively solvatochromic dyes
absorb at *longer* wavelengths as the solvent (water)
becomes more polar or there is an applied electric
field because their excited (charged) state is stabilised

Negatively solvatochromic dyes
absorb at *shorter* wavelengths as the solvent (water)
becomes more polar or there is an applied electric
field because their ground (charged) state is stabilised

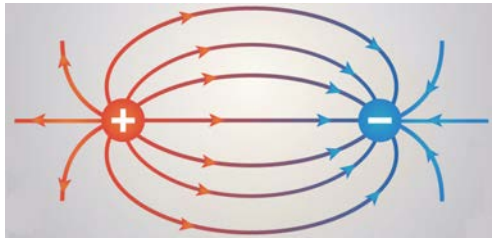
We know potencies affect the spectra of solvatochromic dyes ---
But exactly how?

Are potencies making water more polar
(generating a solvatochromic effect)

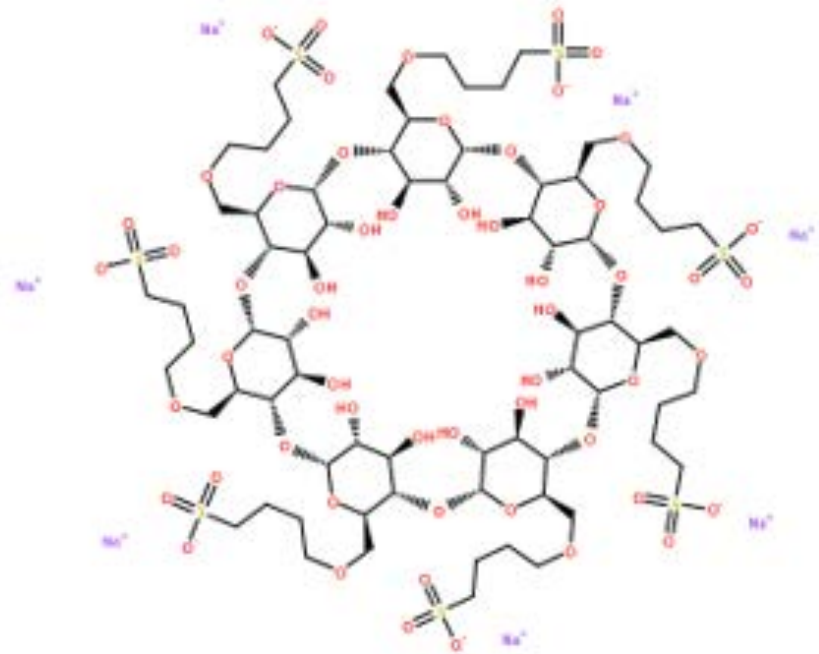


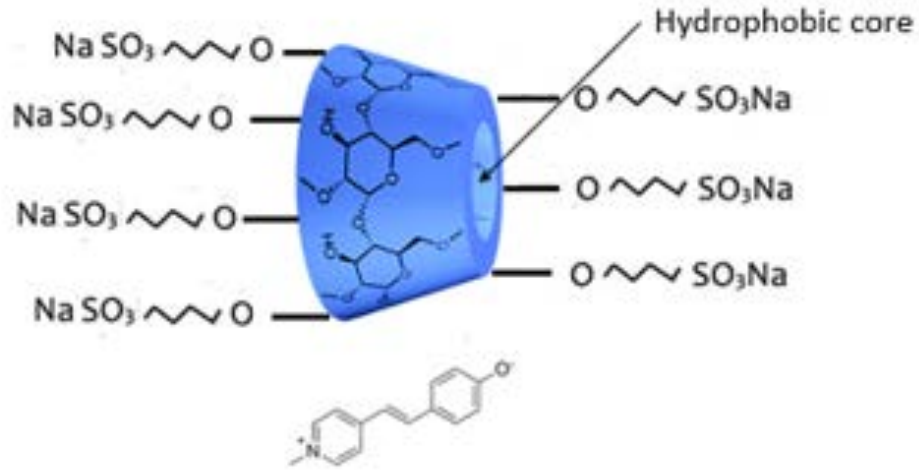


or are they producing an electric field
and acting directly on dyes?



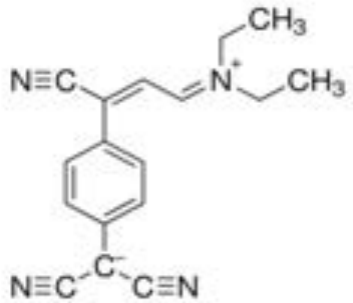
The way to find out is to use cyclodextrins which encapsulate dyes, suppress aggregation and exclude water

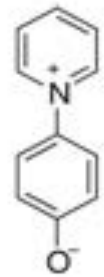


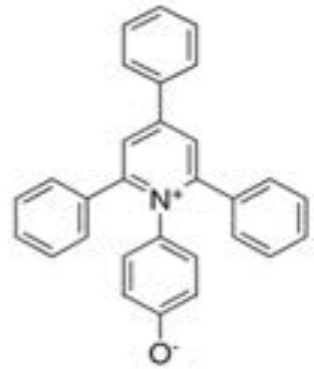

Hydrophobic core
Na SO3 O
Na SO3 O
Na SO3 O
Na SO3 O
O SO3Na
O SO3Na
O SO3Na

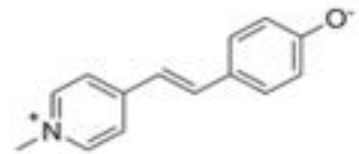
Dyes of widely varying structure have been used in this study – the only common feature being a D-π-A chromophore.

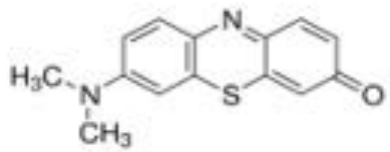

ELECTRON DONOR
ELECTRON BRIDGE
ELECTRON ACCEPTOR

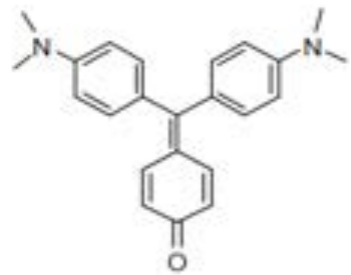


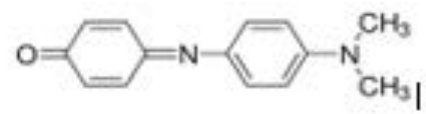


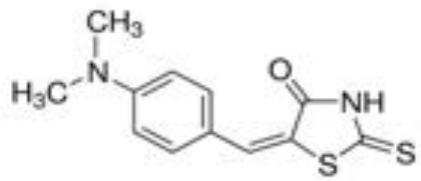










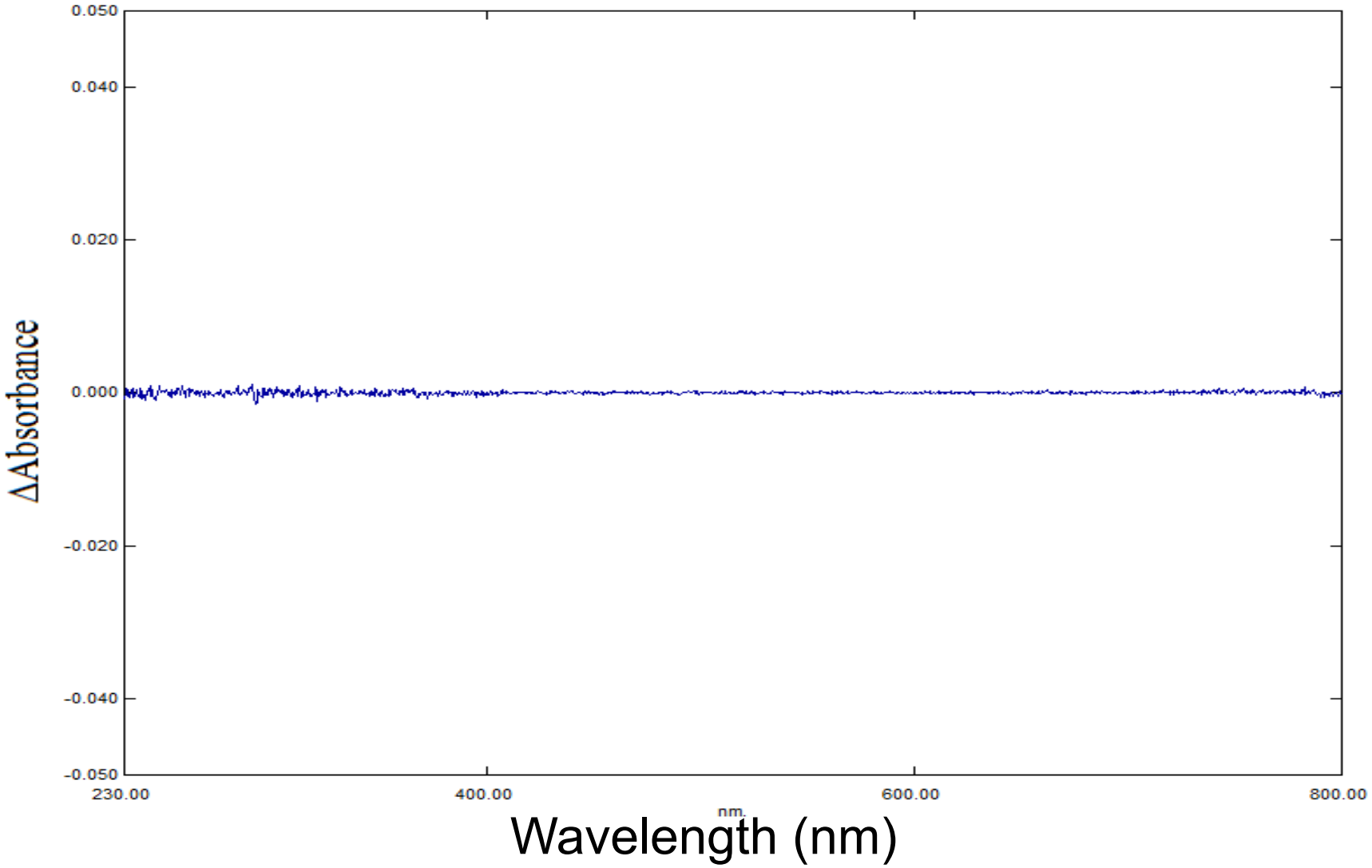


Why use solvatochromic dyes?

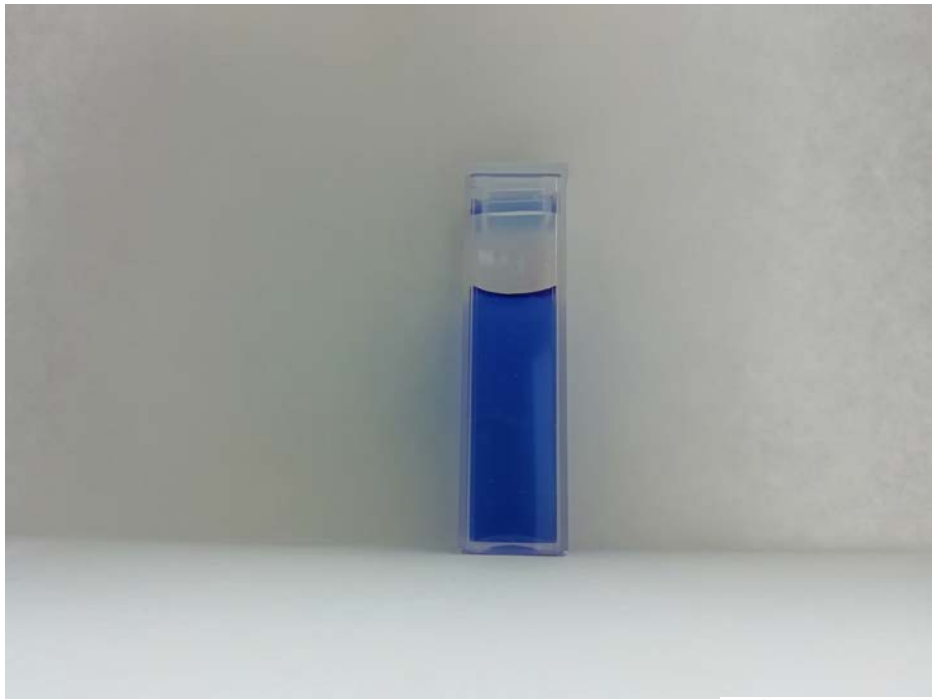
These dyes are very sensitive to environmental conditions e.g. solvent polarity, acid/base conditions, dye-dye interactions, electromagnetic fields

Solvatochromic dyes absorb in the visible region of the spectrum so they are highly coloured and their spectrum (colour) changes according to environmental conditions

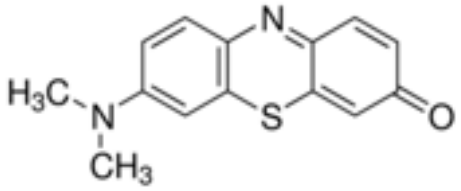
Expected difference spectrum for materially equivalent solutions

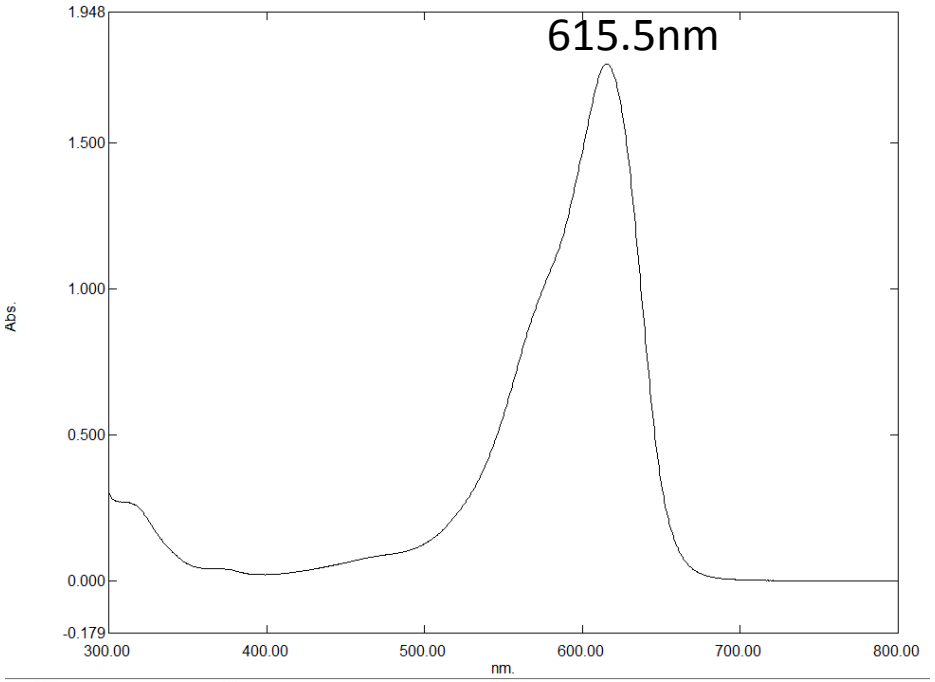


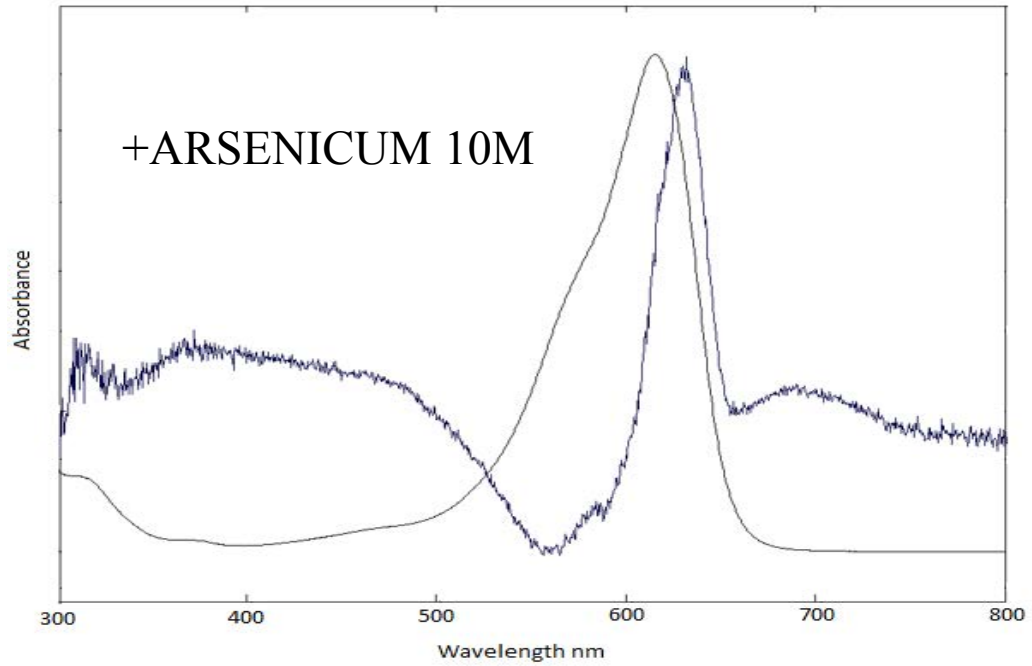
Results with positively solvatochromic dyes



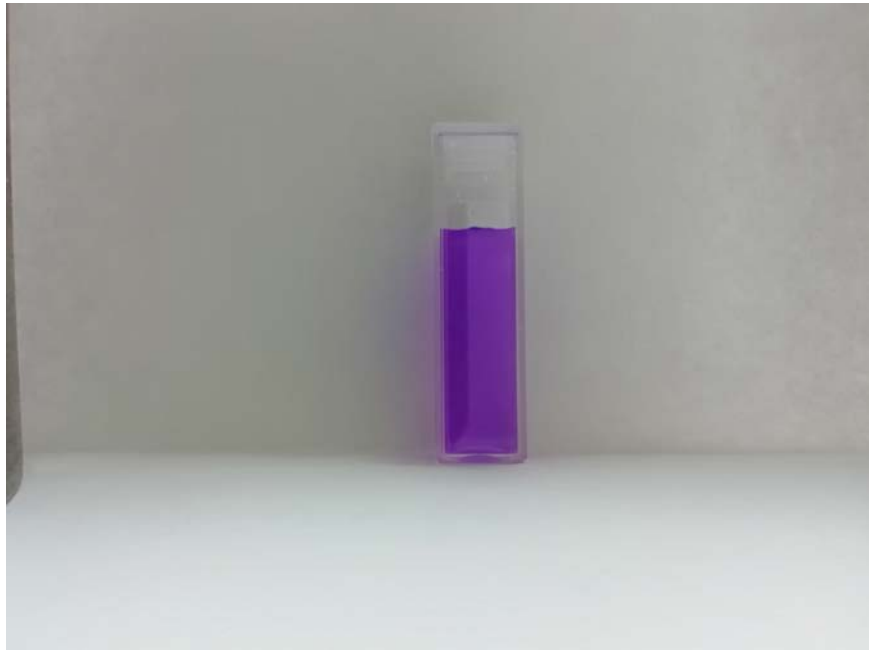
MV/βCD



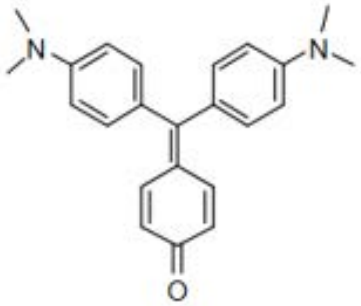


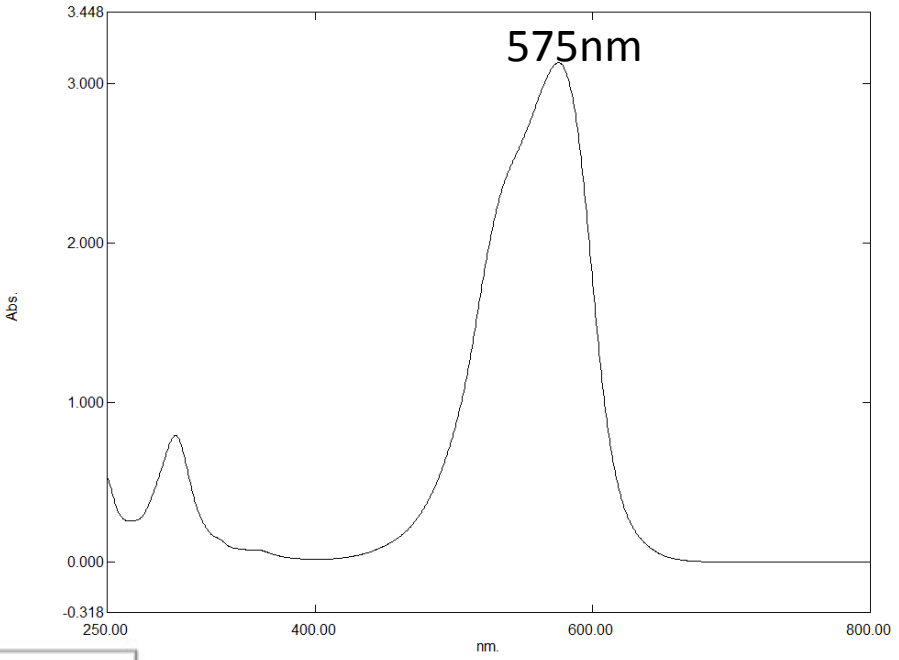


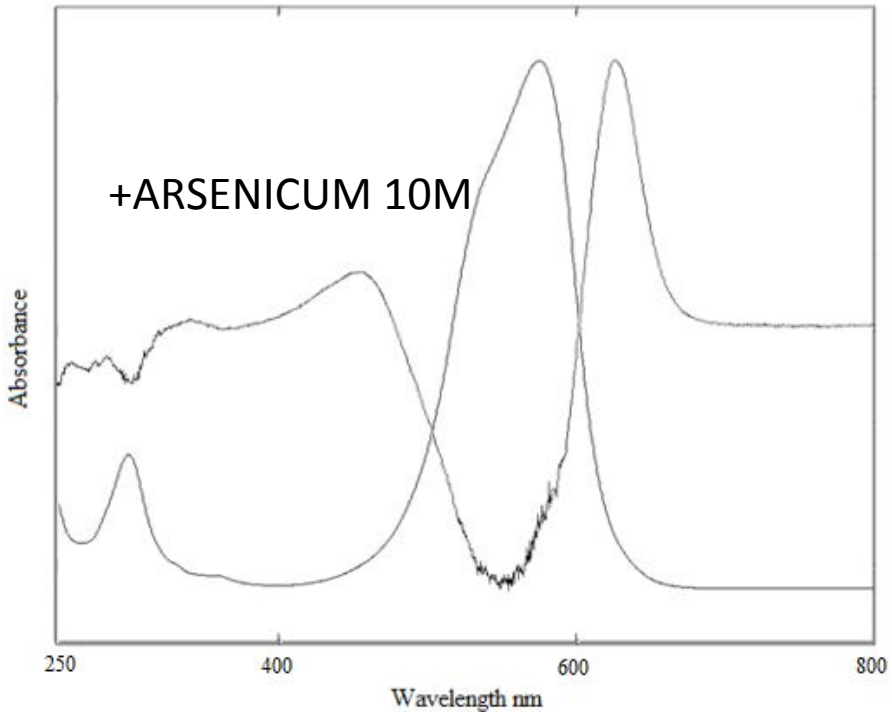
0.5nm shift in spectrum; 2.26% change in absorbance; SD=0.317; N=14; pH 7.5



BDF/βCDSBE

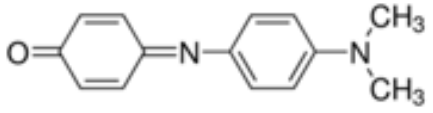


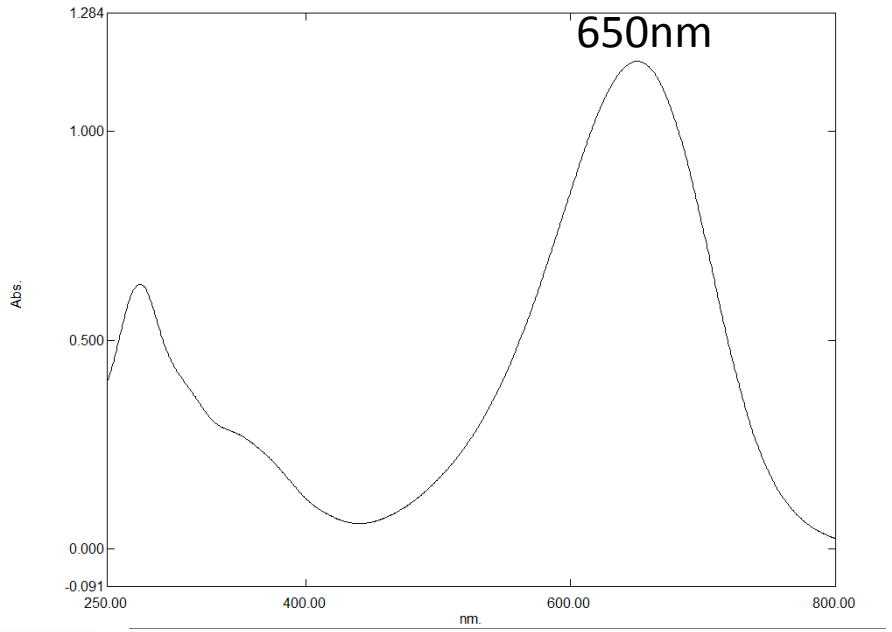


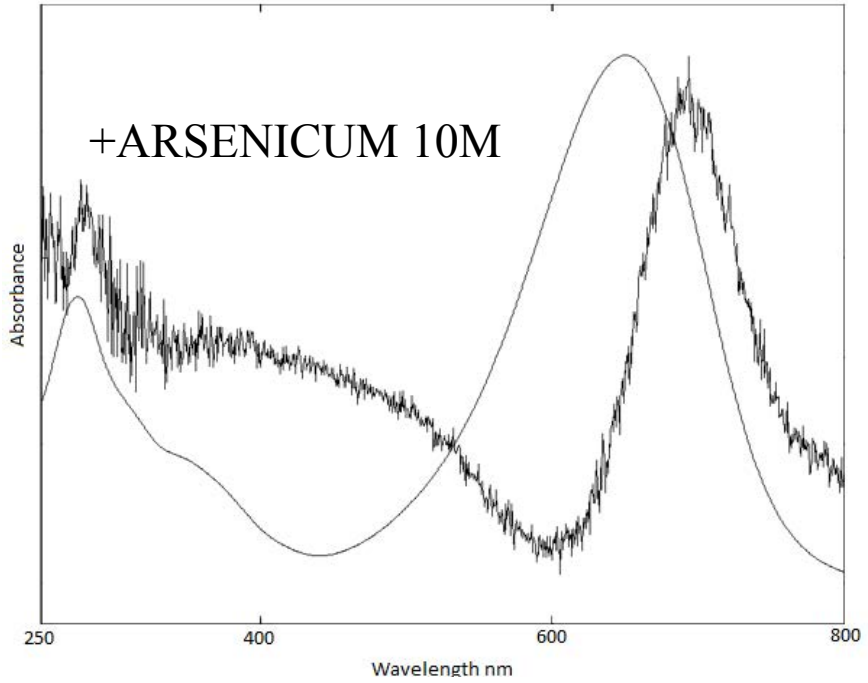


0.4nm shift in spectrum;
2.48% change in absorbance; SD= 0.302
N=6; pH 9.0

PB/αCD

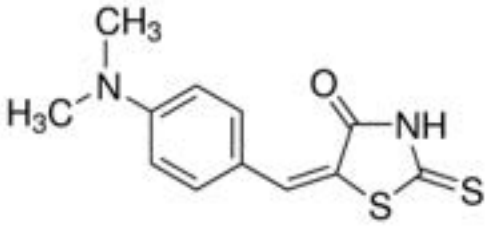


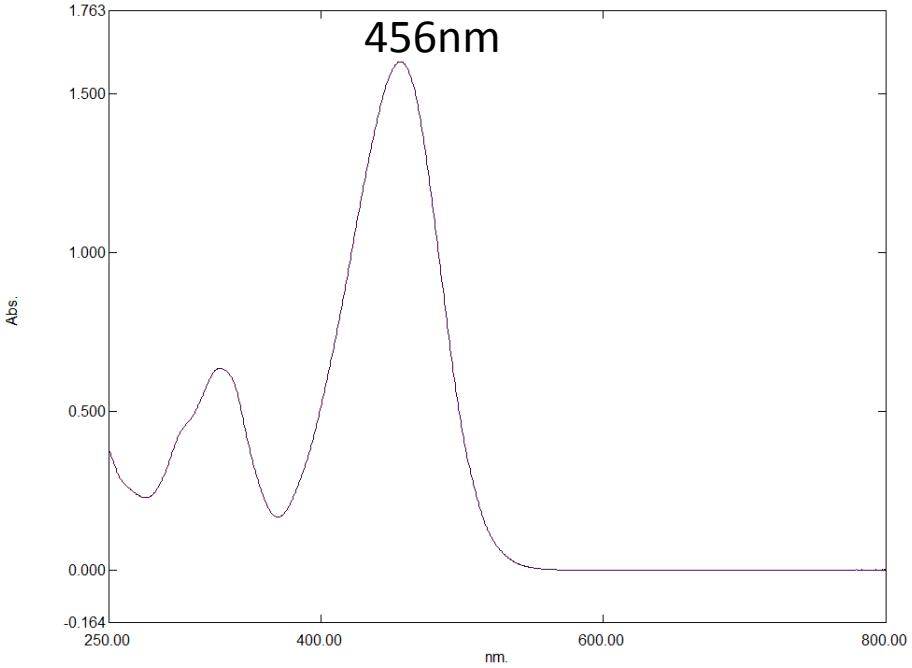


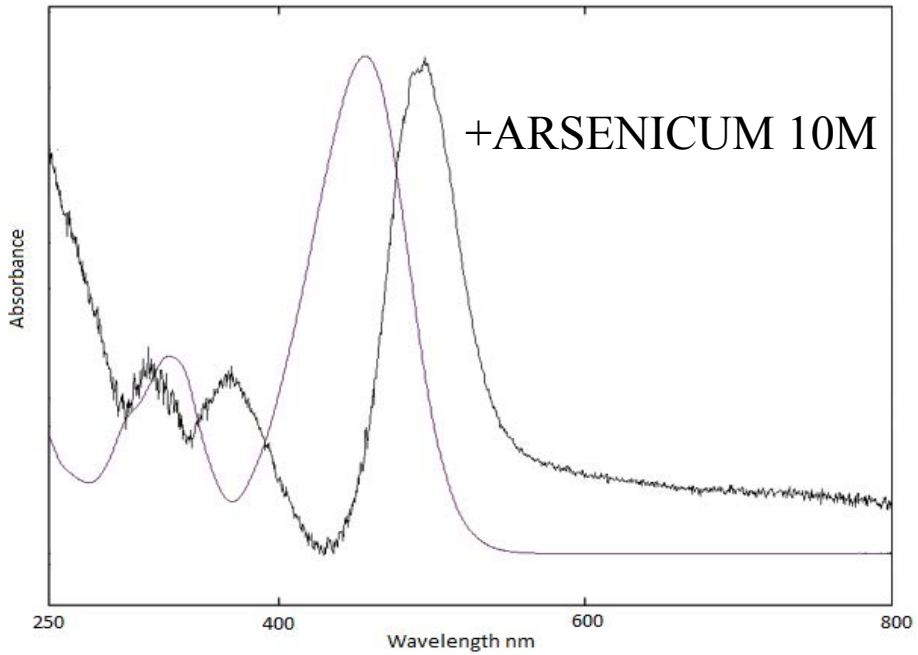


0.4nm shift in spectrum;
0.6% change in absorbance;
SD=0.099; N=4; pH 9.0

DMABR/βCDSBE







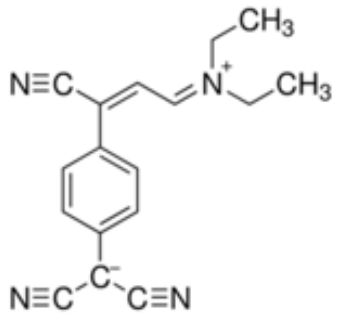
0.25nm shift in spectrum; 1.98% change in absorbance; SD=0.215; N=7; pH 9.0

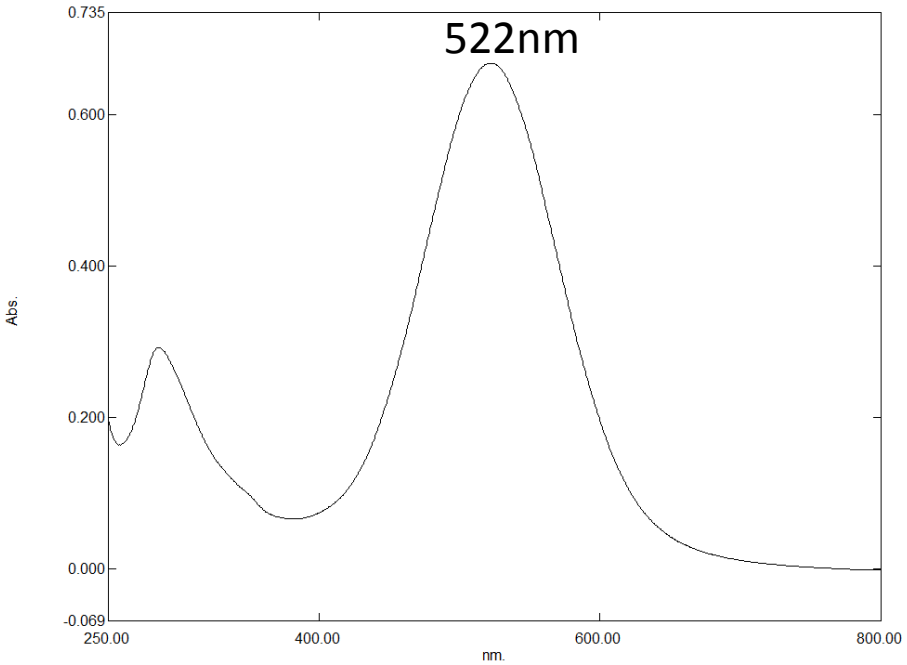
In all cases Ars 10M is causing a shift to *longer* wavelengths in the dyes' spectra.

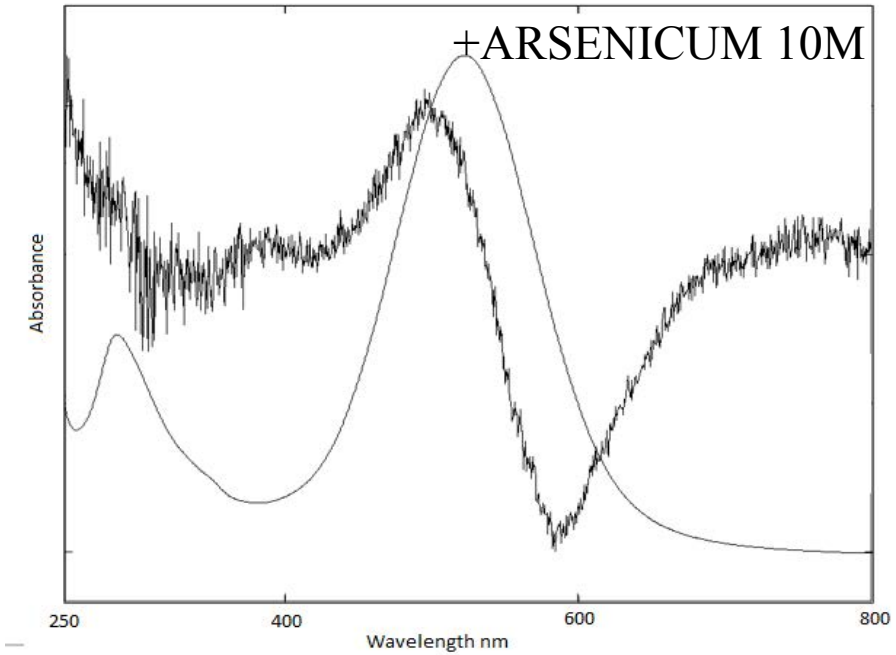
Remember - Positively solvatochromic dyes
absorb at longer wavelengths as the solvent (water) becomes more polar or there is an applied electric field

Results with negatively solvatochromic dyes

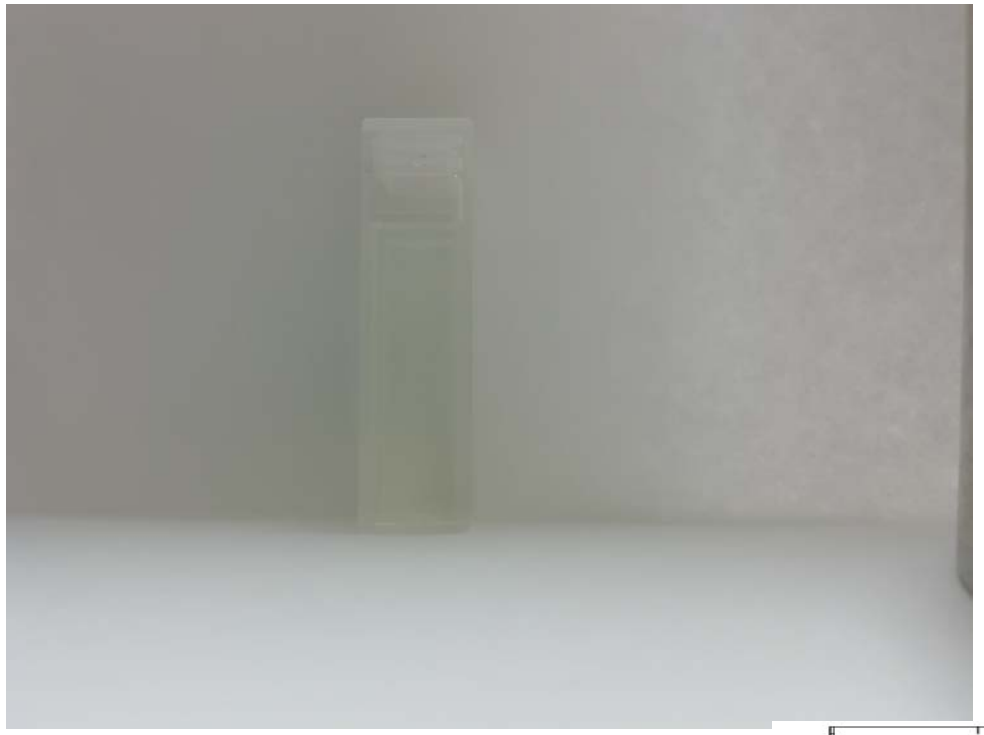
DEMI/βCDSBE



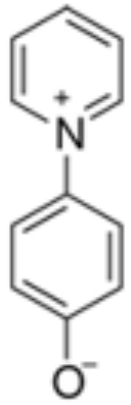


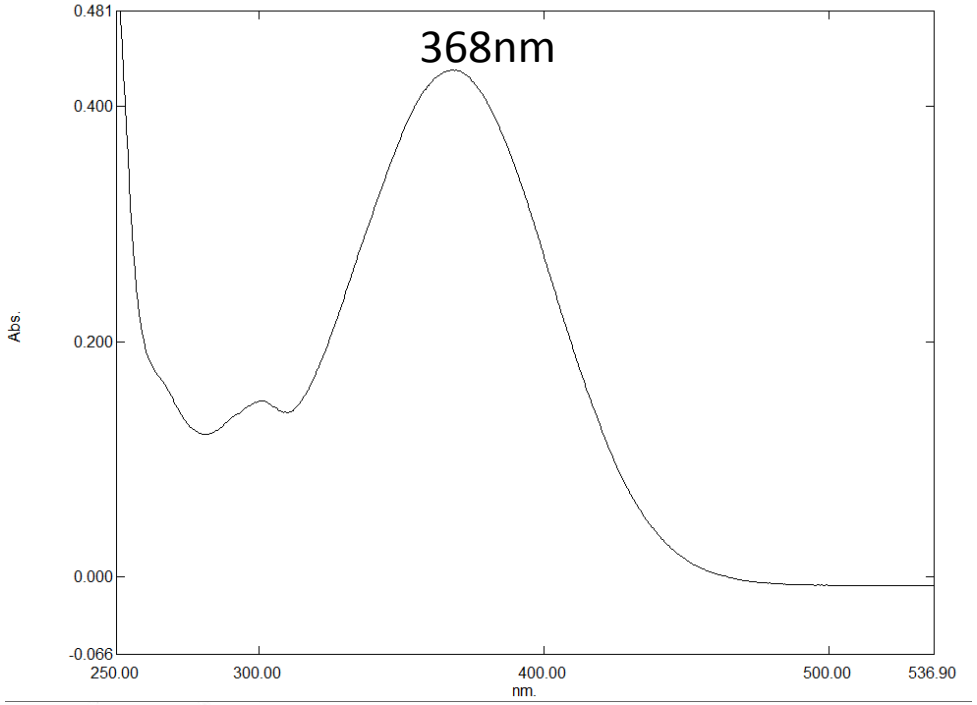


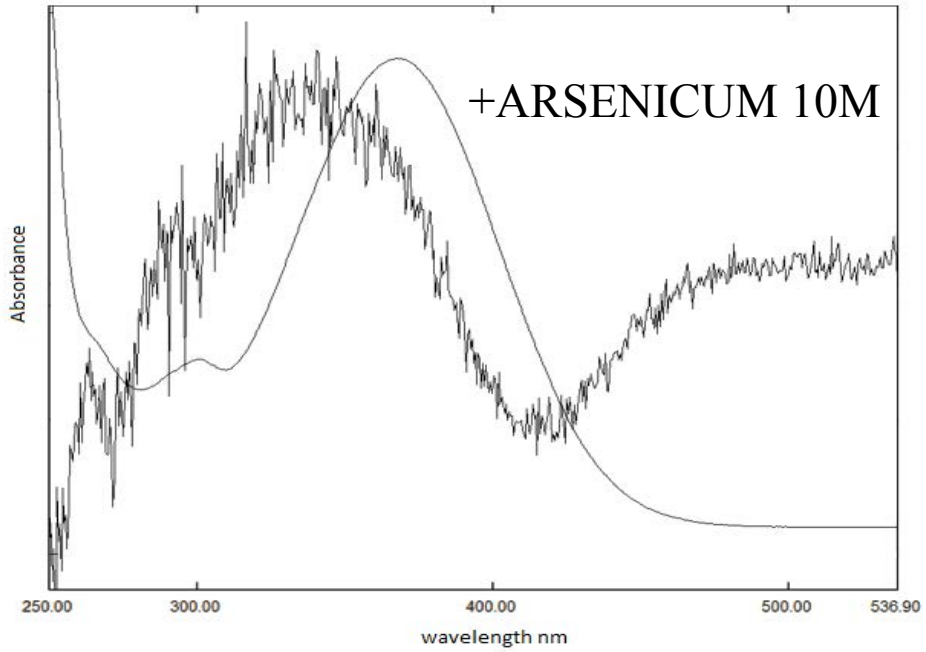
0.2nm shift in spectrum;
0.96% change in absorbance; SD=0.14;
N=5; pH 7.0



4PP/βCD

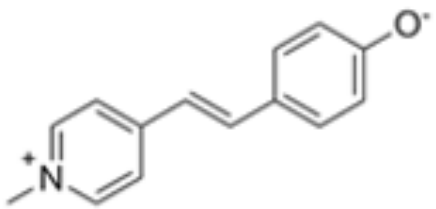


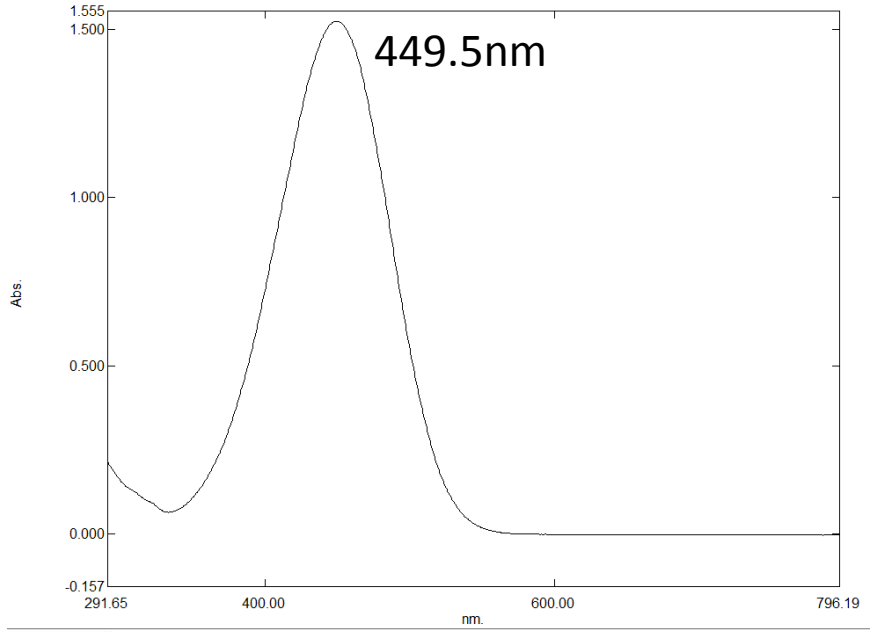


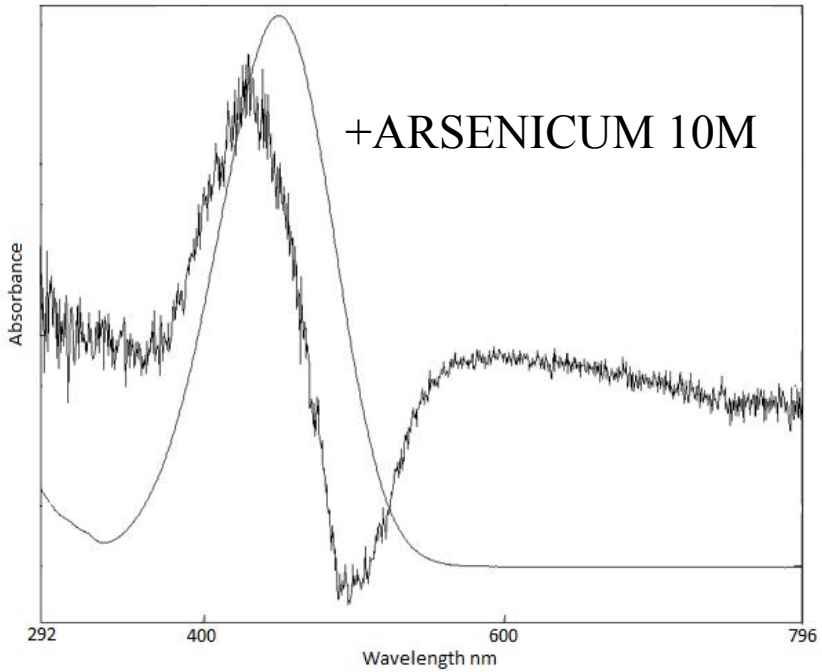


0.2nm shift in spectrum; 0.99% change in absorbance; SD=0.22; N=4; pH 11.0

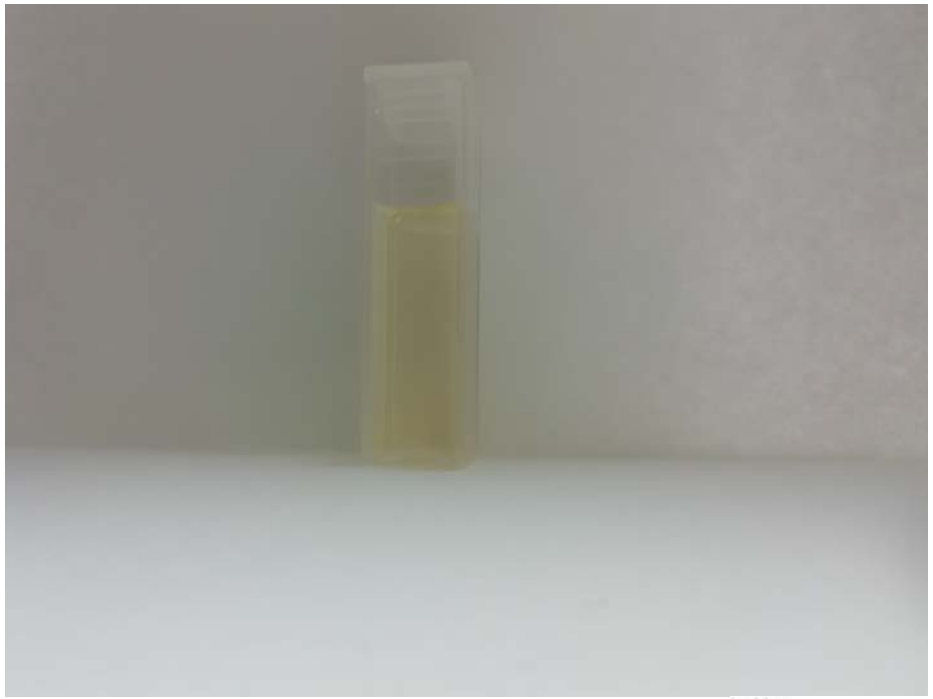
BM/βCD



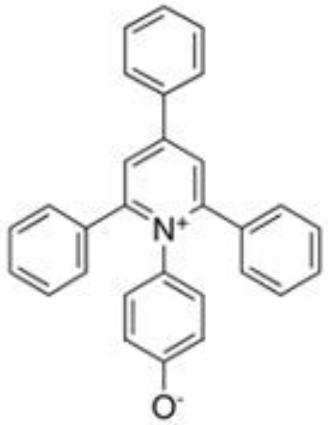


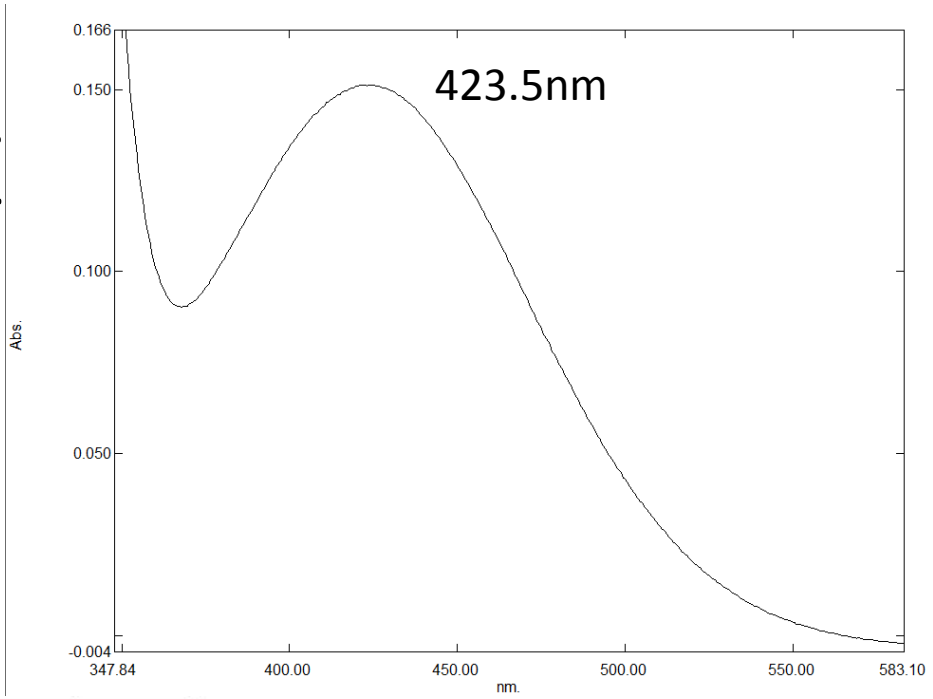


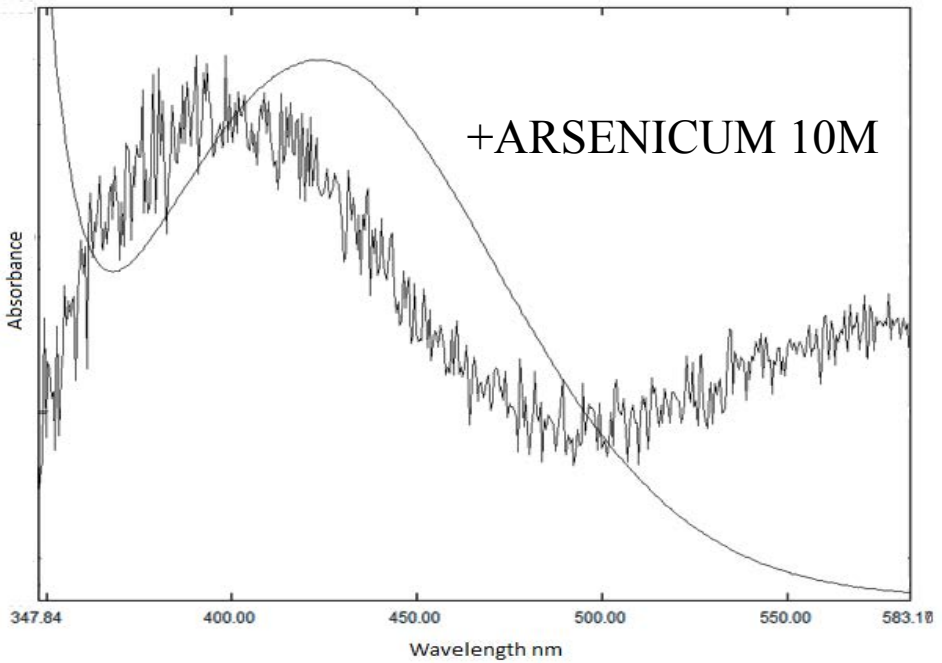
0.2nm shift in spectrum; 1.04% change in absorbance; SD=0.25; N=12; pH 11.0



ET1/βCDSBE







0.3nm shift in spectrum; 0.65% change in absorbance; SD=0.071 N=6; pH 11.0

In all cases *Ars* 10M is causing a shift to ***shorter*** wavelengths in the dyes' spectra

Remember - Negatively solvatochromic dyes
absorb at shorter wavelengths as the solvent (water) becomes more polar or there is an applied electric field

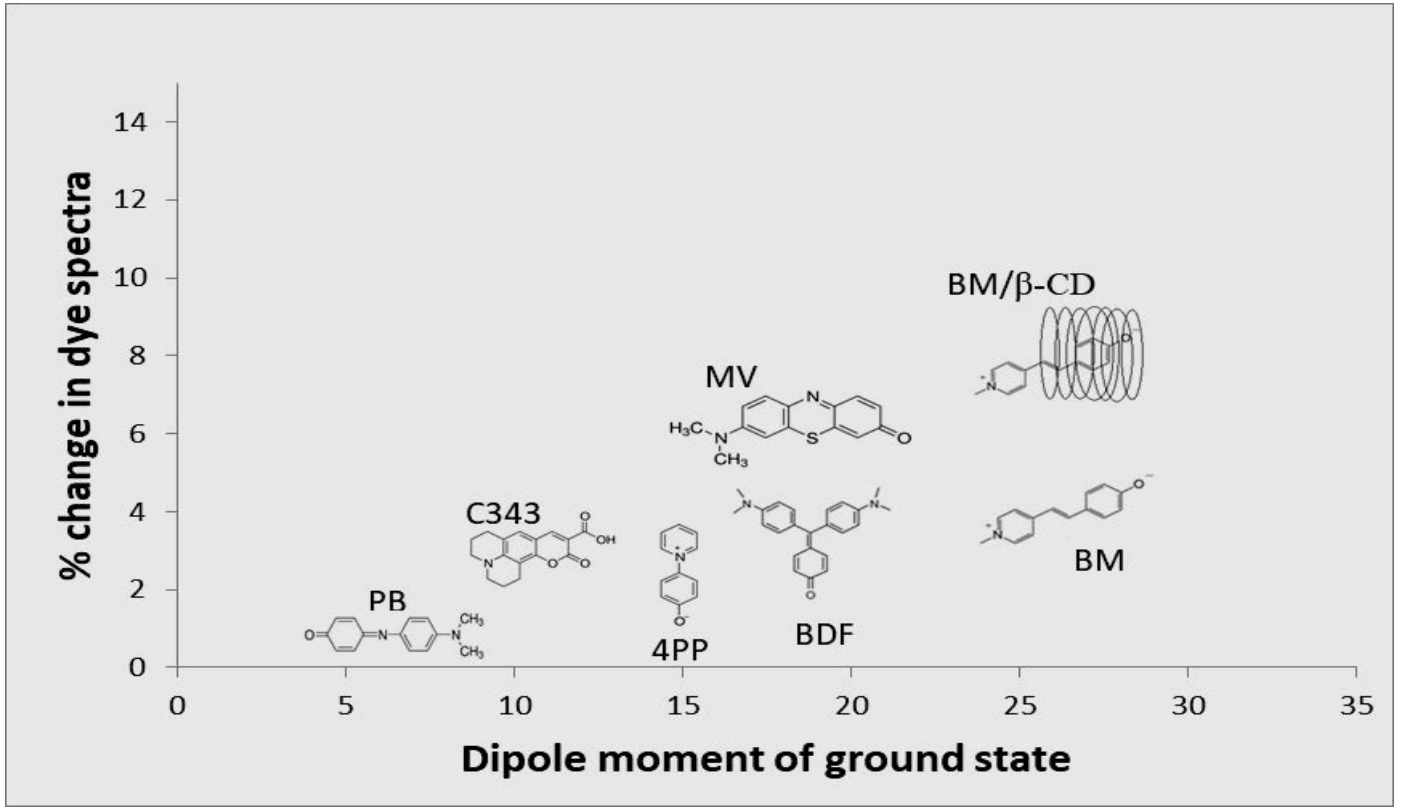
So all dyes - regardless of structure and type of solvatochromism are responding according to the same underlying mechanism.

Which of the two possibilities - an increased solvent polarity mediated effect (solvatochromism) or the presence of an electric field (electrochromism) are operating to produce the effects seen?

Cyclodextrins exclude water from their hydrophobic cores on binding dyes so effective solvation of dye by water is prevented.

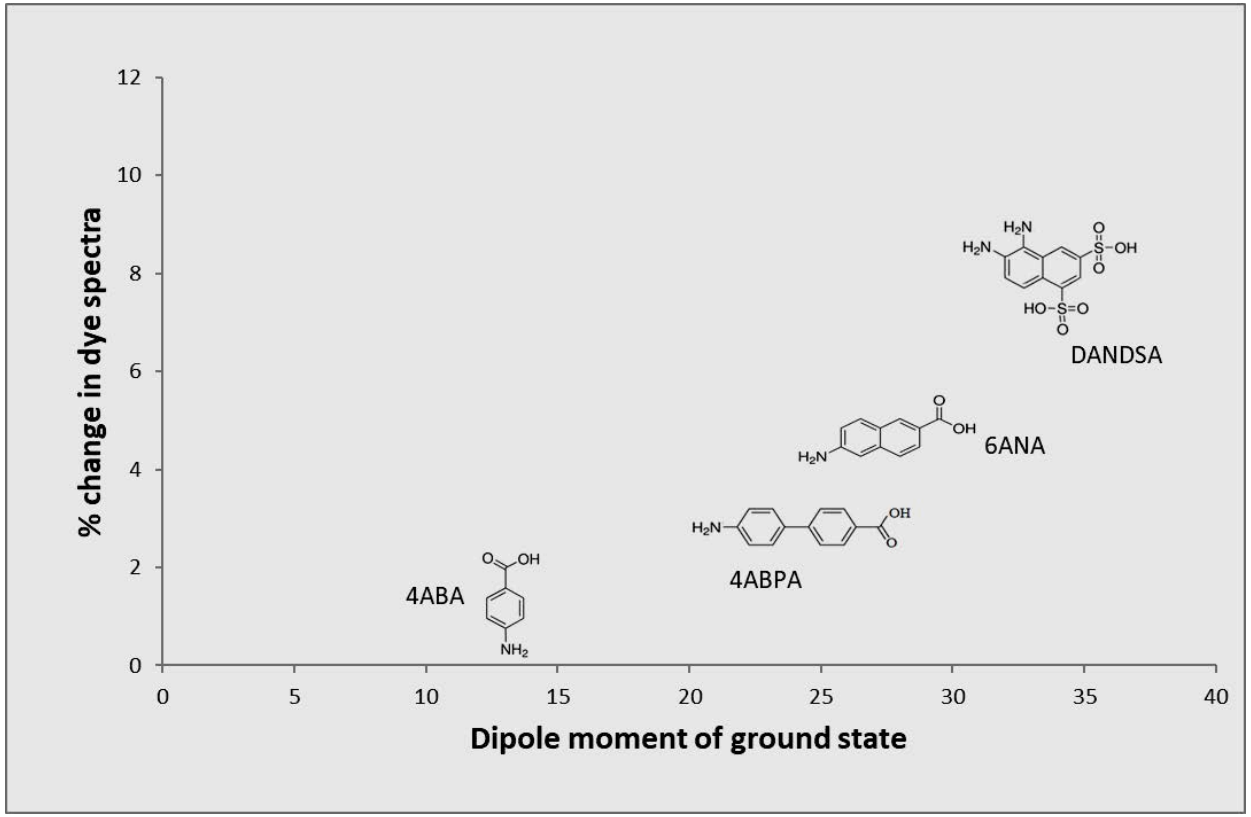
Contact is necessary for a solvatochromic effect, and consequently solvatochromism cannot occur in encapsulated dyes.

It is known however that imbedding dyes in cell membranes or in solid matrices away from solvent does not affect the electrochromic response of push-pull molecular systems



The sensitivity of solvatochromic dyes to homeopathic potencies appears to be a function of dye dipole length and molecular rigidity, **features that do not correlate with solvatochromic response, but do correlate with electrochromic response.**

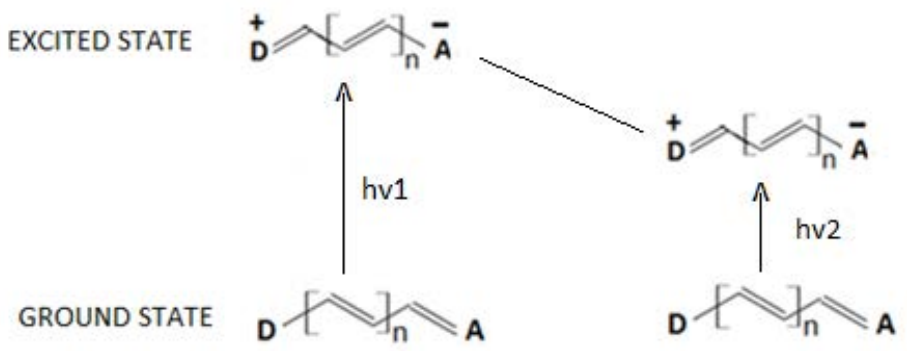
(Cartwright S J, Degree of response to homeopathic potencies correlates with dipole moment size in molecular detectors: Implications for understanding the fundamental nature of serially diluted and succussed solutions. *Homeopathy* 2018; **107:** 19-31.)



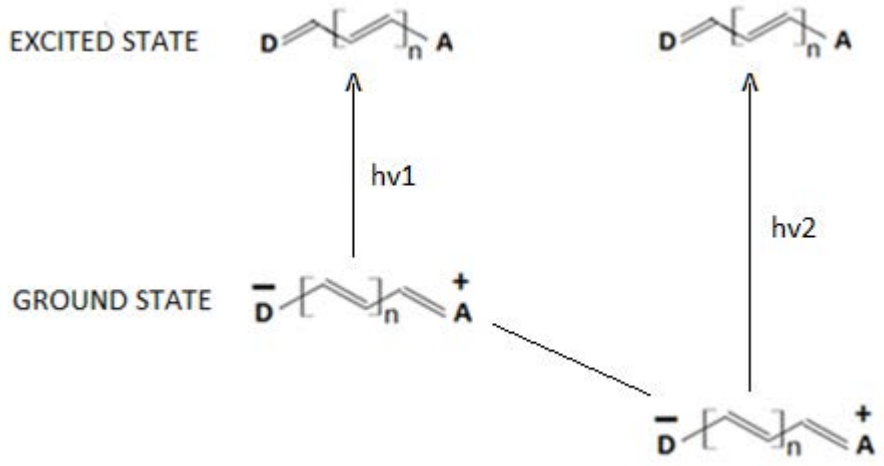
Amino acids and dipeptides have their dipole moments increased and electron density distribution affected in electric fields, but they are not solvatochromic**. Previous studies have shown π -bridged amino acids to be sensitive to homeopathic potencies, but not to solvent polarity.**

(Cartwright S J, Degree of response to homeopathic potencies correlates with dipole moment size in molecular detectors: Implications for understanding the fundamental nature of serially diluted and succussed solutions. *Homeopathy* 2018; **107:** 19-31.)

Positively solvatochromic dyes in the presence of an electric field



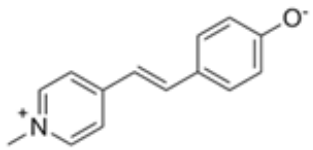
Negatively solvatochromic dyes in the presence of an electric field



Therefore, if the results cannot be explained by a potency-induced change in solvent polarity then the dyes must be responding to an electric field coming from *Arsenicum* 10M

Is it possible to assign an approximate strength to this field from looking at how much the spectra of the dyes are shifted by *Ars* 10M and correlating this with recorded shifts due to applied electric fields of known strength?

For Brooker's merocyanine



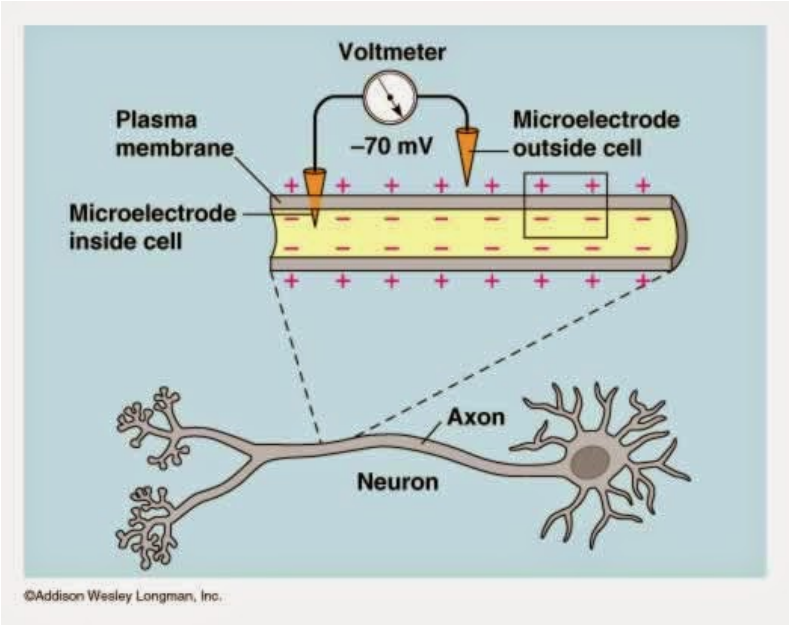
both solvatochromic and electrochromic data are available, which means it is possible to equate shifts in this dye's spectra with the magnitude of an unknown electric field (in this case *Ars* 10M)

These calculations give an approximate electric field strength for *Ars* 10M of

$\approx 10^7$ V/m

This can be compared with the strength of the electric field across the membrane of a human neurone (the resting potential) which is

$7\text{-}8 \times 10^6$ V/m

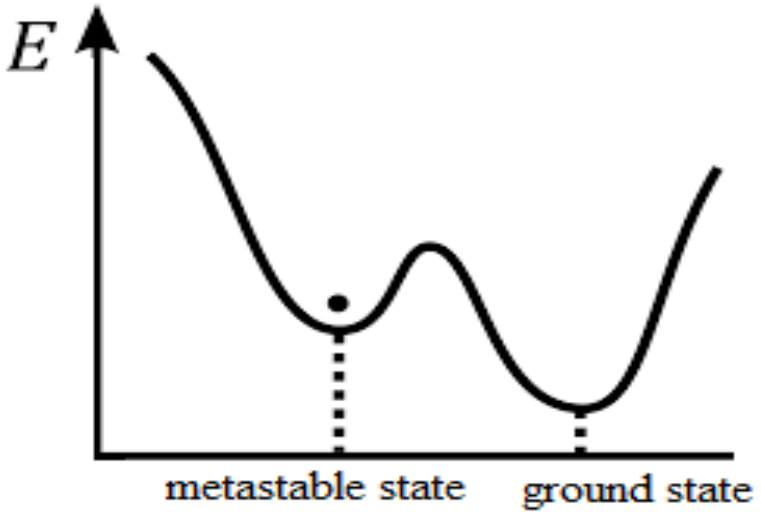


and of cell membranes in general

$(4\text{-}8 \times 10^6$ V/m)

So the strength of the *Ars* 10M electric field is certainly of a magnitude that could result in physiological/biochemical changes, at least with regard to cell membrane potential differences, and possibly other biochemical processes.

For there to be an electric field there have to be separated charges - but how is that possible?
Potencies must be in a metastable state where charges are prevented from recombining



Conclusions

- The use of encapsulated solvatochromic dyes, whereby water is excluded, suggests Arsenicum 10M acts directly on dyes rather than through the medium of water.
- Positively and negatively solvatochromic dyes collectively respond in complementary ways to Arsenicum 10M indicating the stabilisation of excited and ground electronic states respectively. This is only possible if Arsenicum 10M possesses an electric field.
- The strength of this electric field can be calculated to be around $10^7\ \mathrm{V/m}$ which is equivalent to the potential difference across cell membranes.
- The strength of the postulated *Ars* 10M electric field is of a magnitude that could result in physiological/biochemical changes.
- In order for potencies to possess an electric field they must be composed of separated charges in a metastable state

Characterization of *Antimonium crudum* Activity Using Solvatochromic Dyes

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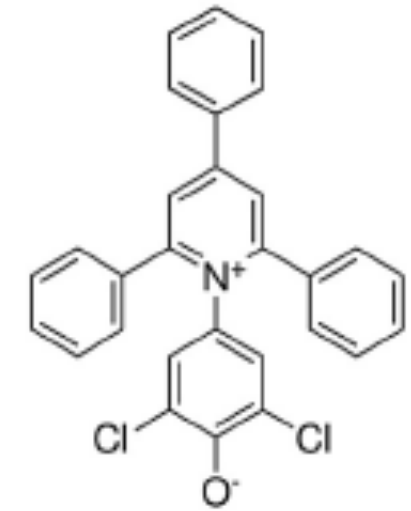
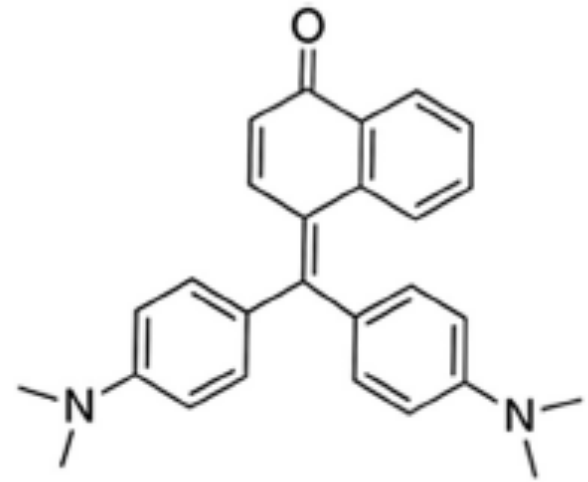
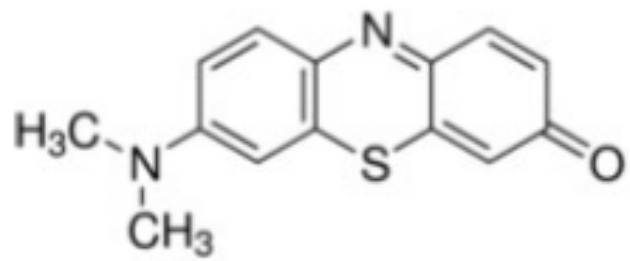
Homeopathy



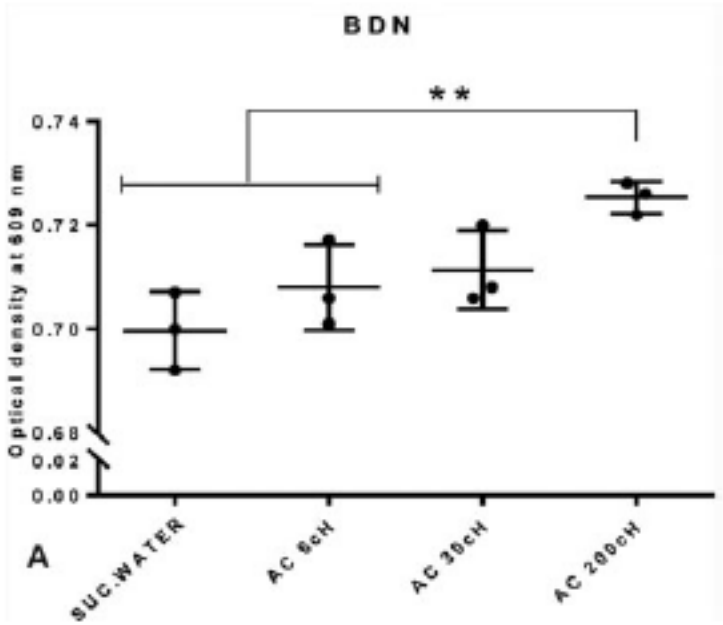
ET33

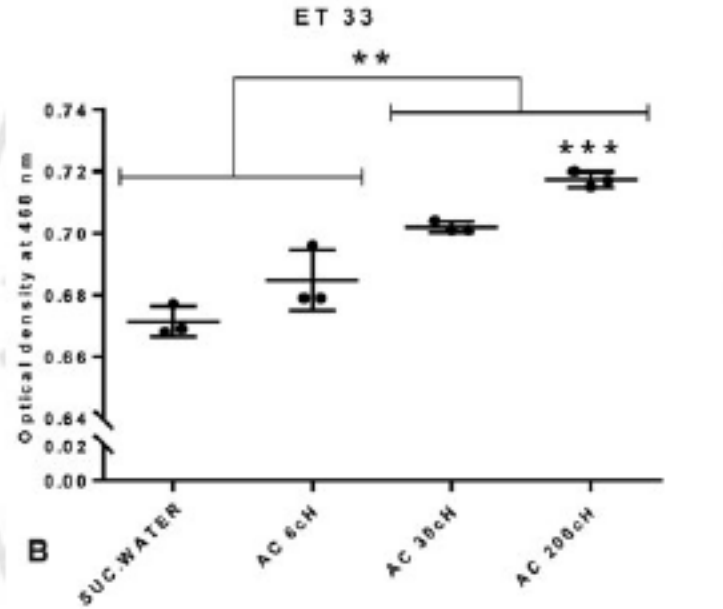


BDN



MV





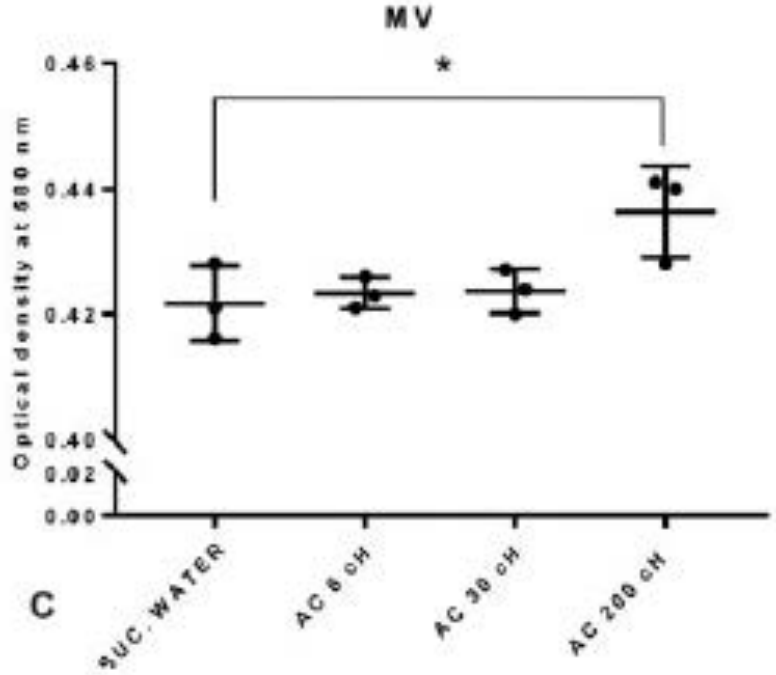
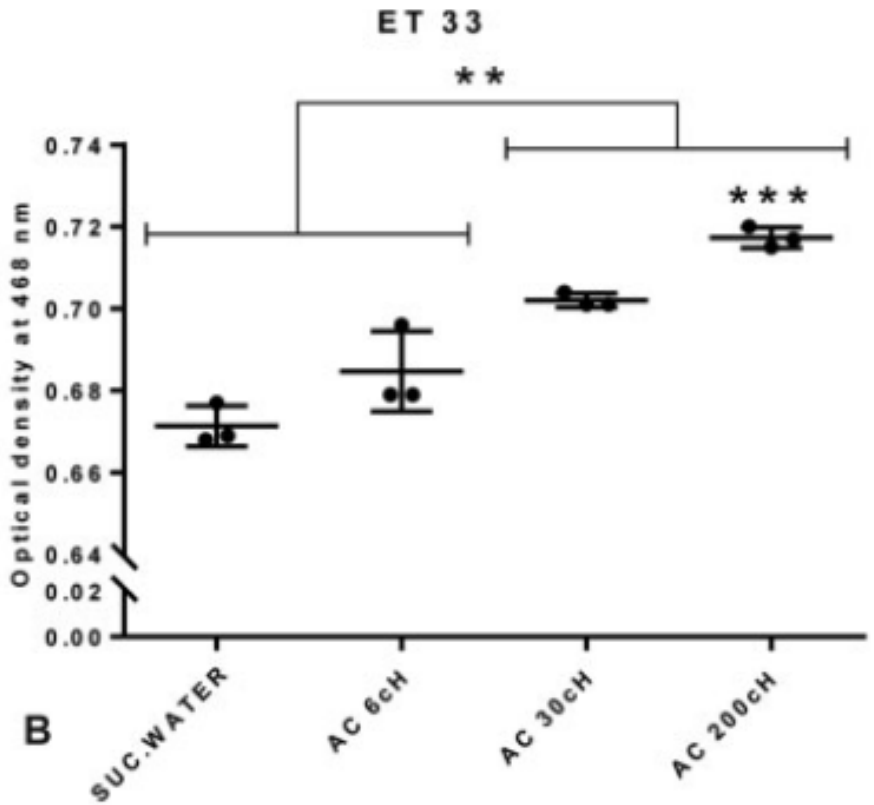


Fig. 3 Analysis of absorbance peaks obtained for dyes BDN (A), ET33 (B), and MV (C) and different dilutions of *Antimonium crudum* or succussed water. For BDN (A), $F(3,8) = 7.22$, $p = 0.01$; $^{**}p = 0.008$ (Tukey). For ET33 (B), $F(3,8) = 37.21$, $p < 0.0001$; $^{**}p \leq 0.03$, and $^{***}p = 0.044$ only in relation to AC 30cH. For MV (C), $F(3,8) = 5.138$, $p < 0.03$; $^{*}p = 0.034$ (Tukey). Data represent mean ± standard deviation and the scattered data points. BDN, dimethylamino naphthalenone; ET33, pyridinium phenolate, MV, methylene violet.



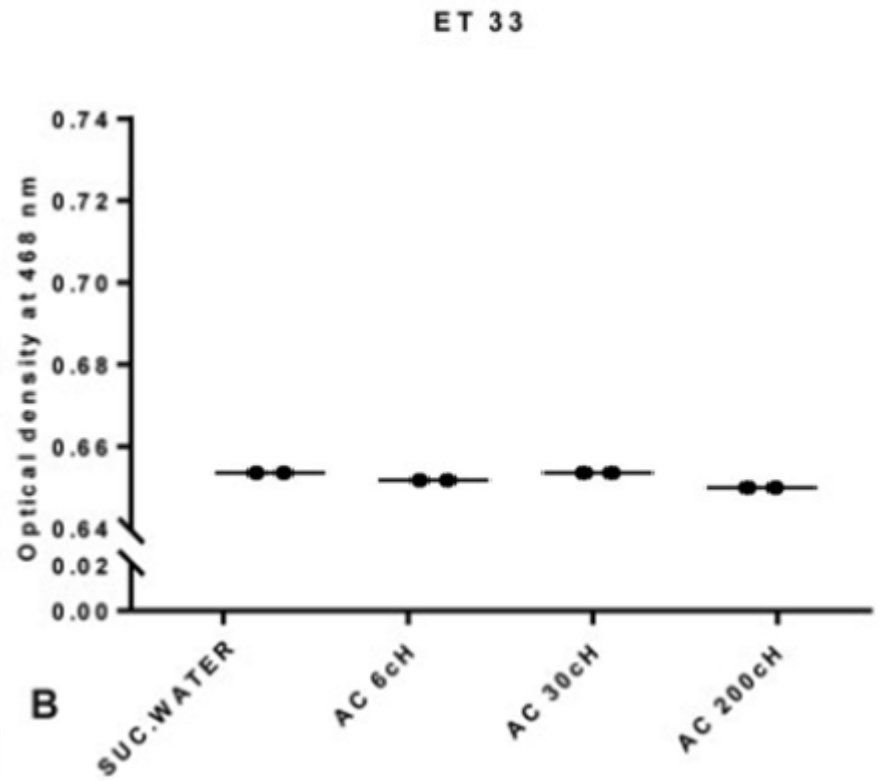
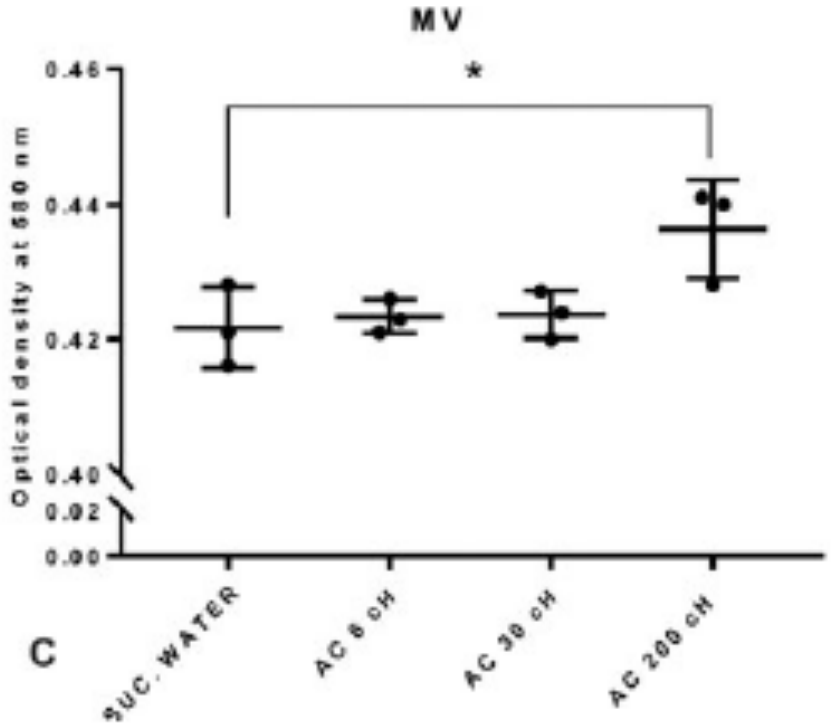
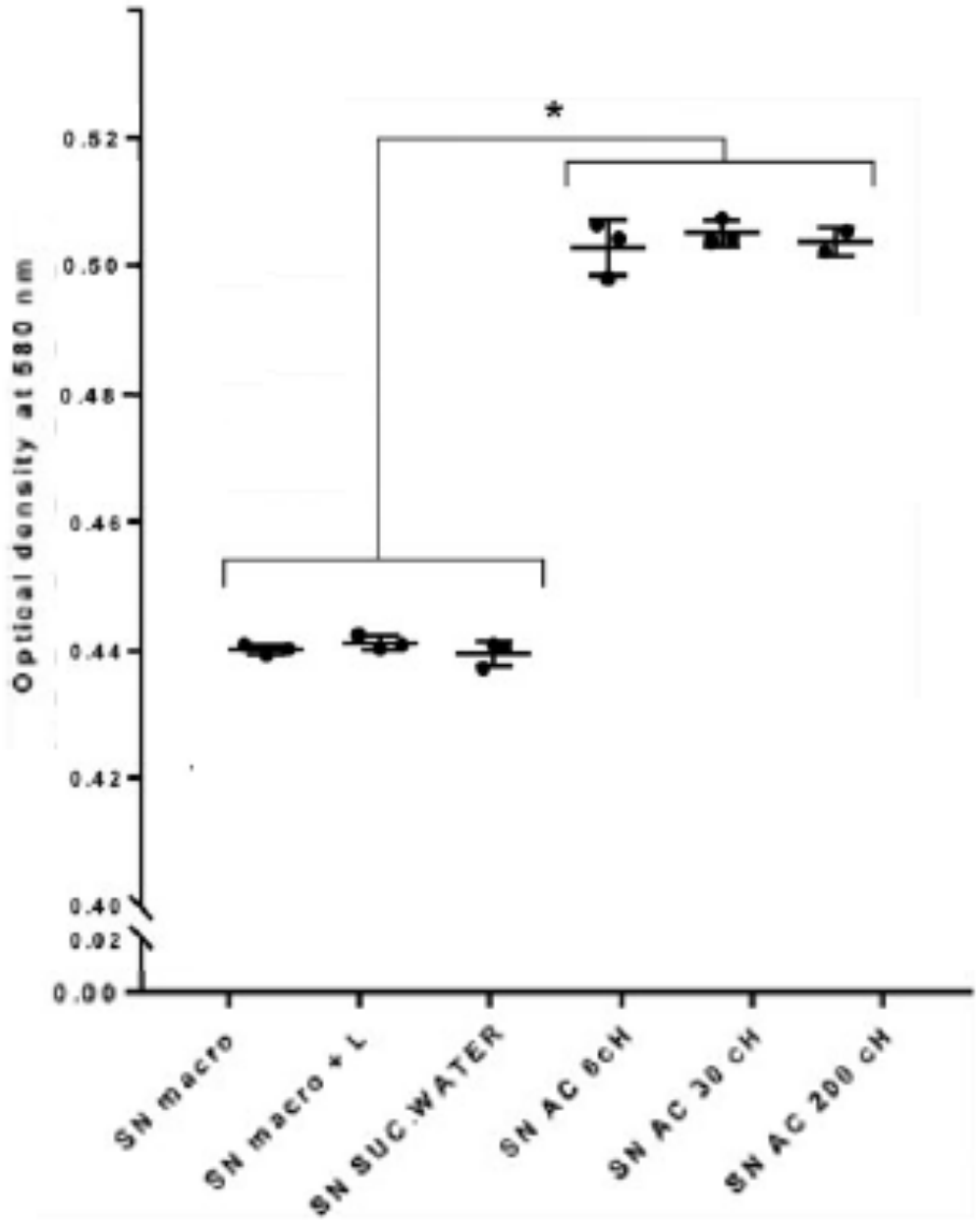


Fig. 4 Analysis of absorbance peaks obtained for dye pyridinium phenolate and different dilutions of *Antimonium crudum* (AC) that had been submitted to a weak electric current. One-way analysis of variance (see text for details). Data represent mean ± standard deviation and the scattered data points.

Fig. 5 Analysis of methylene violet absorbance at 580 nm following addition of supernatants from infected and *Antimonium crudum*-treated macrophages (SN AC 6cH, AC 30cH, and AC 200cH) in relation to controls (succussed water, supernatant from uninfected and untreated macrophages [SN macro]) and supernatant from *Leishmania amazonensis*-infected but untreated macrophages (SN macro + L)). $F(5,11) = 176.2$, $^*p < 0.0001$, one-way analysis of variance, followed by Tukey (see text for details). Data represent mean ± standard deviation and the scattered data points.





Conclusions

- The physico-chemical effects of potencies of *Antimonium crudum* on solvatochromic dyes have been shown to correlate with previously described biological effects using a macrophage/*Leishmania amazonensis* model and previous physico-chemical studies using a range of solvatochromic dyes.
- Pulses of weak electric current completely abolish the effect of *Ant-c* potency solutions as measured by their effect on the spectra of the solvatochromic dye ET33.
- Supernatants of *Ant-c* treated, *Leishmania amazonensis*-infected, macrophages (cells) amplify potency strength as measured using the solvatochromic dye MV.
- Supernatants from Ant-c-treated cells increased the range of potencies of *Ant-c* that were capable of producing effects on the spectra of MV.
- **These results suggest that the chemical and biological activities of *Ant-c* potencies may be electromagnetic in nature, and that biological systems can amplify potencies. This in turn suggests a resonant interaction between remedy and patient may occur.**

Interaction between Solvatochromic Dyes and Water Sampled from a Natural Source Treated with High Dilutions of Phosphorus

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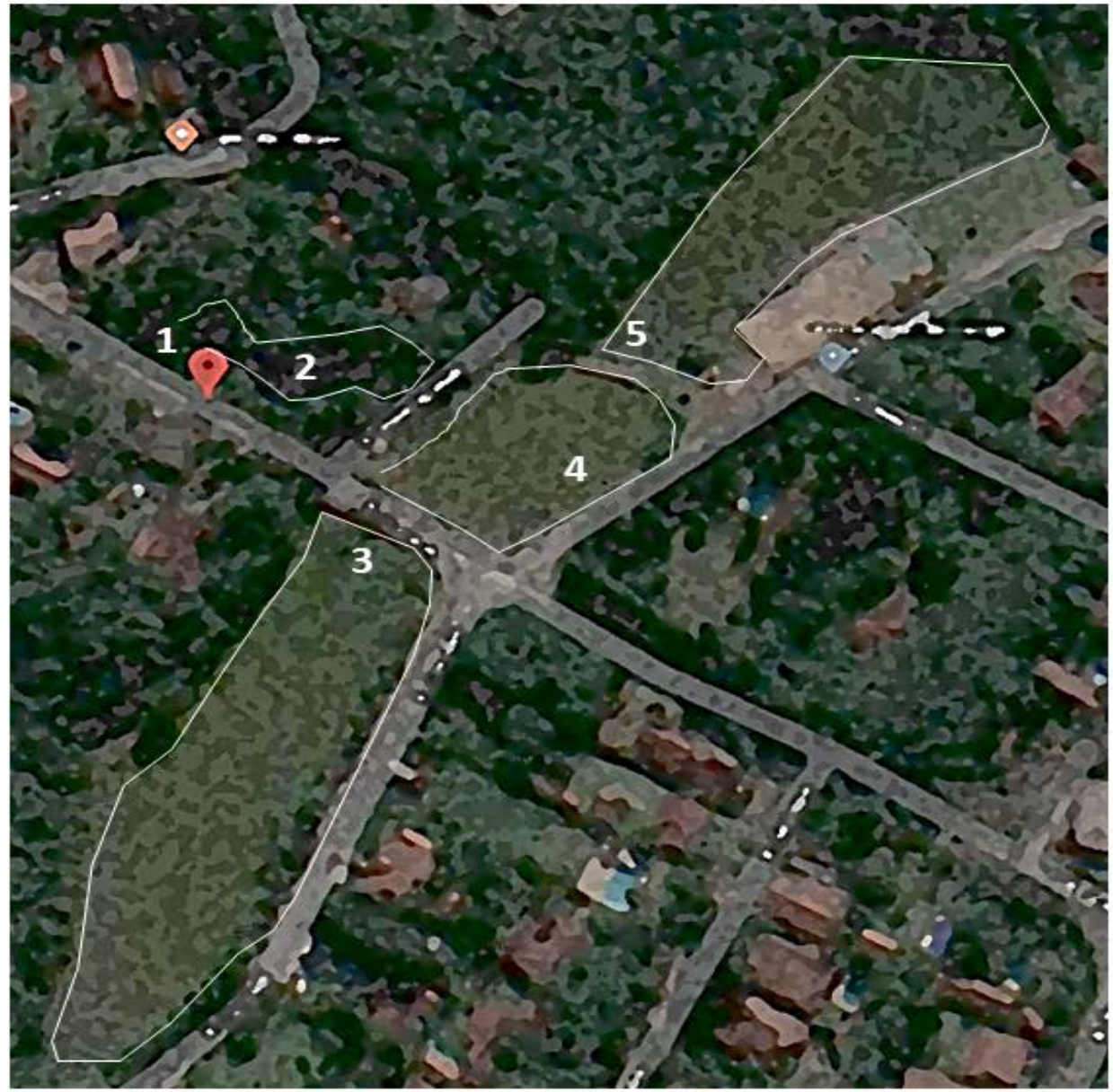
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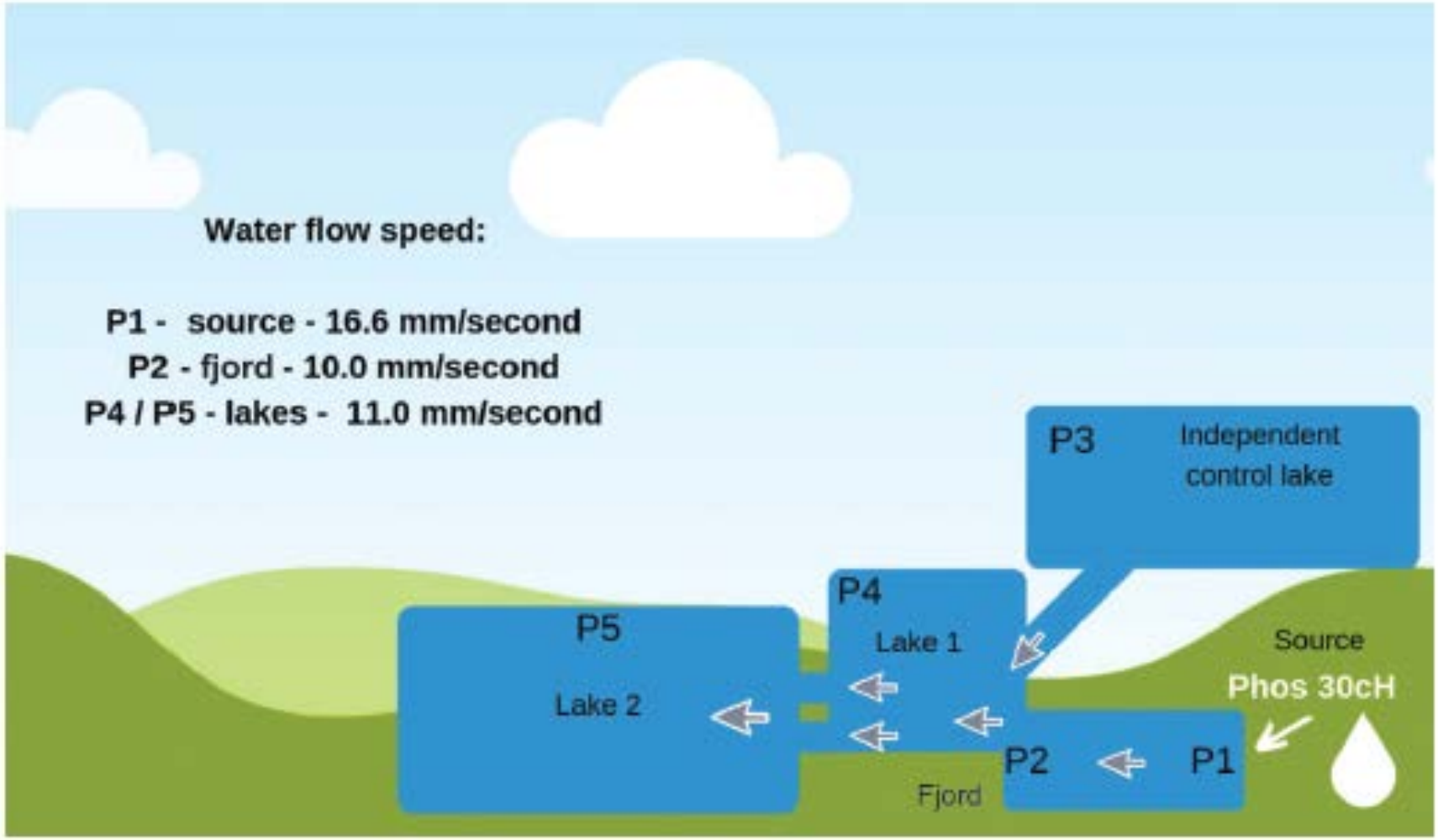
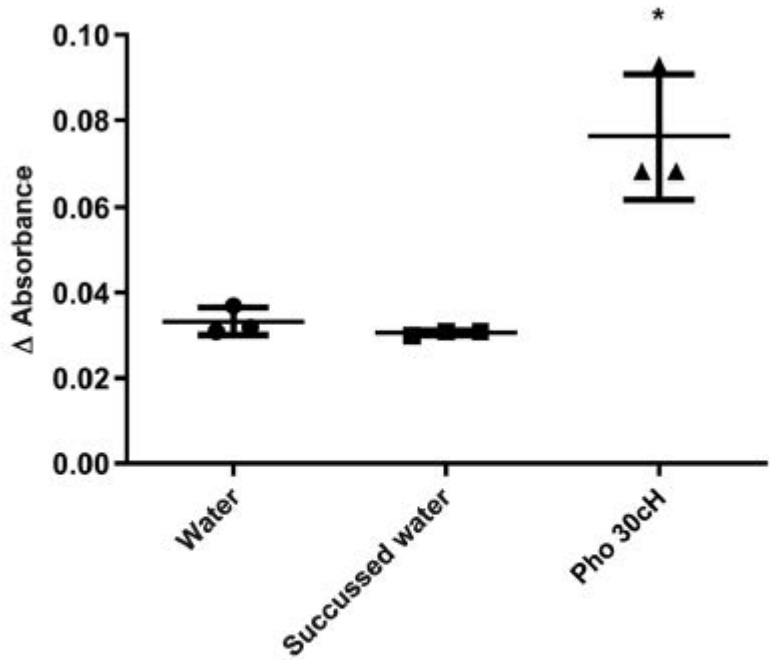


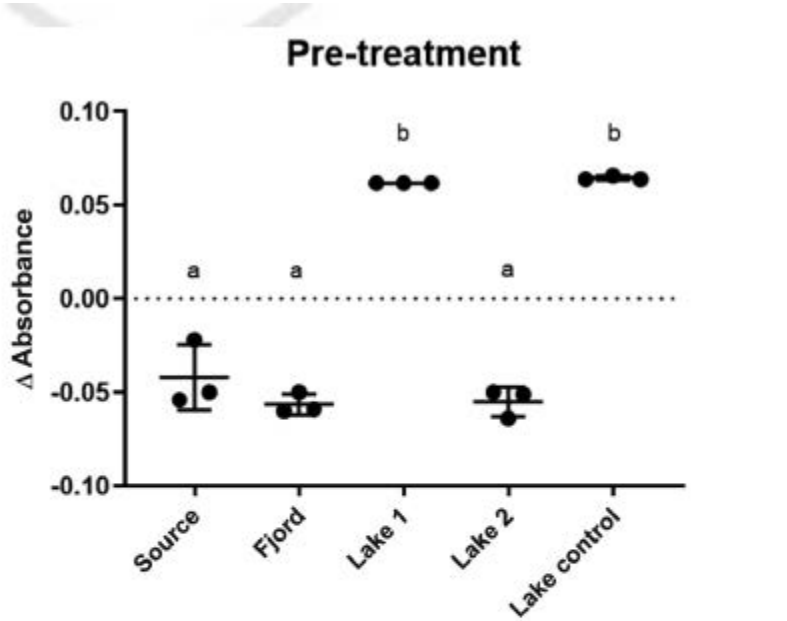
Schematic design of the lakes and sampling points, with the water flow shown by arrows and the respective speeds in each compartment.

Total volume 55 million litres



* $p \leq 0.002$ rel. controls, ANOVA, Tukey. F(2,6) = 27.0

Fig. 2 Analysis of Δ methylene violet absorbance at 578 nm following addition of Phos 30cH in relation to controls (pure water and pure succussed water). Mean and ± standard deviations are shown for the data points. ANOVA, analysis of variance.



* $p \leq 0.0001$, comparing (a) and (b). ANOVA, Tukey. F(4,10) = 149.8

Fig. 3 Analysis of Δ methylene violet absorbance at 578 nm following addition of water taken from different locations in the lakes system prior to the addition of Phos 30cH. Mean and ± standard deviations are shown for the data points. Zero represents no change on addition of lake water to dye solutions. No statistical differences were seen between samples from the fjord and lake 2 (**B**) and from lake 1 and the control lake (**C**). ANOVA, analysis of variance.

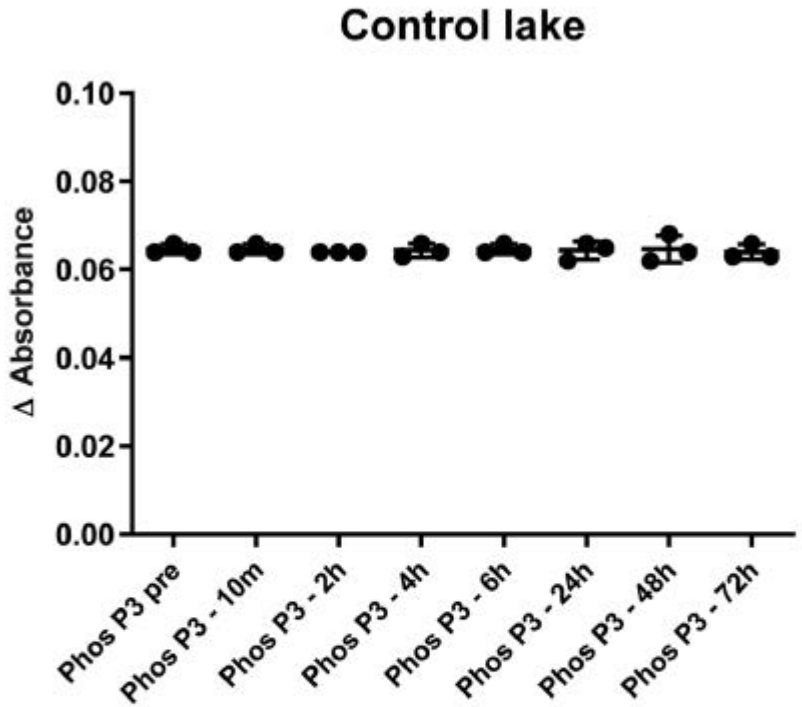


Fig. 8 Analysis of Δ methylene violet absorbance at 578 nm for the control (independent) lake water samples (point 3; P3), before and after the addition of Phos 30cH to the source (point 1; P1). No statistical significance was observed between treated samples, at different times, in relation to the initial pre-treatment sample. Mean and ± standard deviations are shown for the data points. ANOVA, analysis of variance.

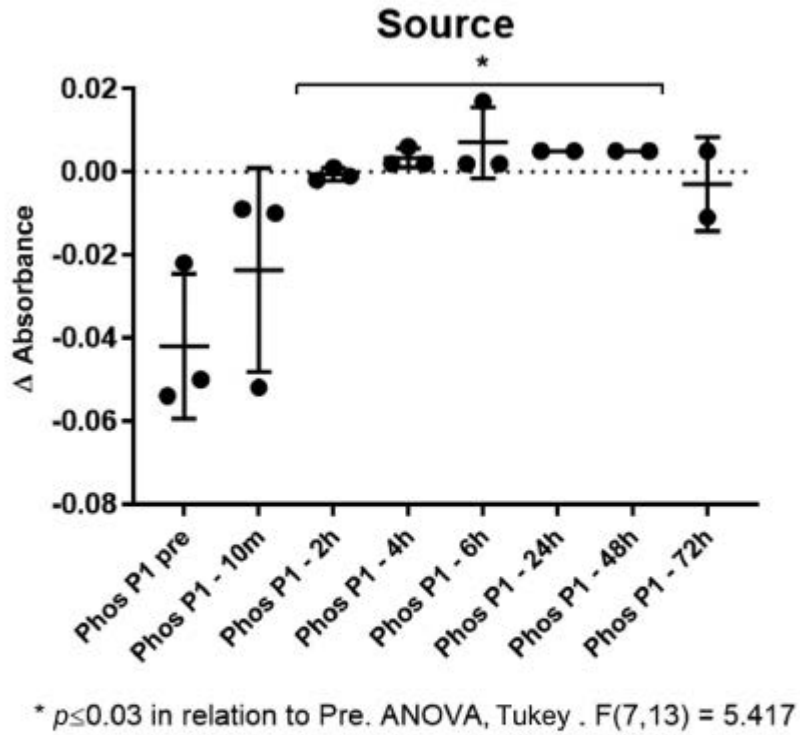
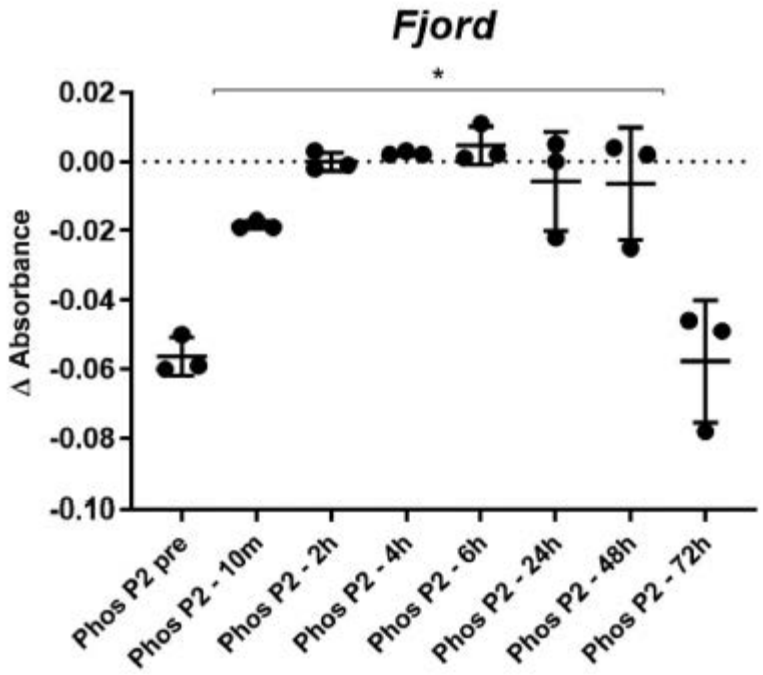
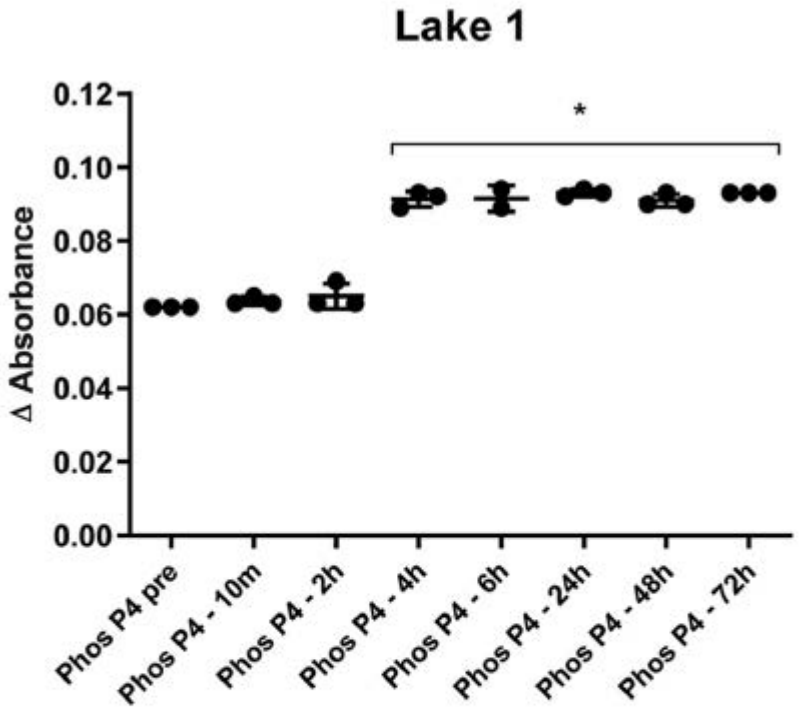


Fig. 4 Analysis of Δ methylene violet absorbance at 578 nm for the source water samples (point 1; P1), before and after the addition of Phos 30cH. Statistical significance was observed between treated samples, at different times, in relation to the initial pre-treatment sample. Mean and ± standard deviations are shown for the data points. ANOVA, analysis of variance.



* $p \leq 0.007$ in relation to Pre. ANOVA, Tukey . F(7,16) = 18.45

Fig. 5 Analysis of Δ methylene violet absorbance at 578 nm for the fjord water samples (point 2; P2), before and after the addition of Phos 30cH to the source (point 1; P1). Statistical significance was observed between treated samples, at different times, in relation to the initial pre-treatment sample. Mean and ± standard deviations are shown for the data points. ANOVA, analysis of variance.



* $p \leq 0.0001$ in relation to Pre, 10 min and 2h.
ANOVA, Tukey. F(7,15) = 171.0

Fig. 6 Analysis of Δ methylene violet absorbance at 578 nm for lake 1 water samples (point 4; P4), before and after the addition of Phos 30cH to the source (point 1; P1). Statistical significance was observed between treated samples, at different times, in relation to the initial pre-treatment sample. Mean and ± standard deviations are shown for the data points. ANOVA, analysis of variance.

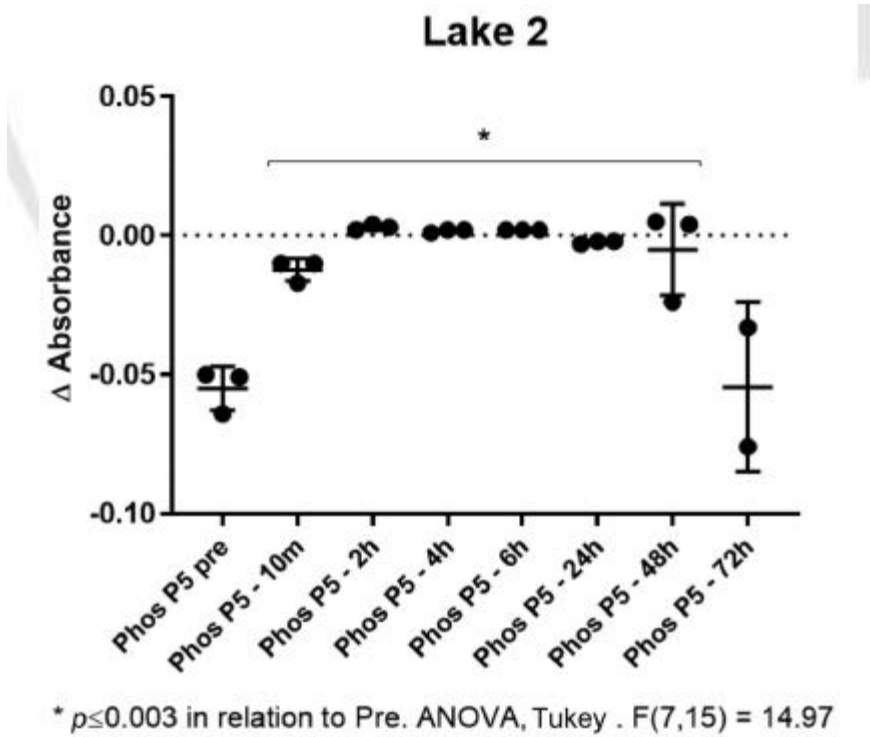
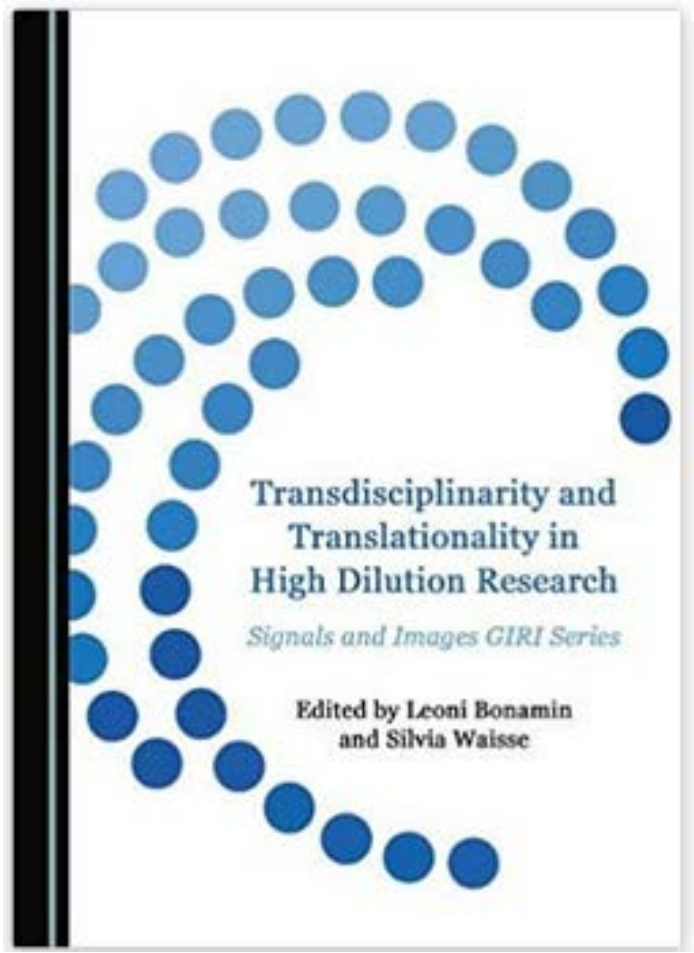


Fig. 7 Analysis of Δ methylene violet absorbance at 578 nm of the lake 2 (point 5; P5) water samples, before and after the addition of Phos 30cH to the source (point 1; P1). Statistical significance was observed between treated samples, at different times, in relation to the initial pre-treatment sample. Mean and ± standard deviations are shown for the data points. ANOVA, analysis of variance.

Conclusions

- The spread of Phosphorus 30 through large volumes of water (55 million litres) in a natural setting can be tracked using solvatochromic dyes.
- The propagation of potency through the lake system occurs rapidly and can be detected within minutes
- Maximum potency levels are reached by 2 hours and persist for up to 48-72 hours.
- The decline in detectable potency after 48-72 hours indicates a natural mechanism for potency destruction.
- The spread of potency through large water volumes opens up a range of veterinary and ecological possibilities in the homeopathic treatment of animals.



Using the unique spectroscopic properties of push-pull molecular systems to investigate homeopathic potencies

Cartwright SJ.

Transdisciplinarity and Translationality in High Dilution Research. Signals and Images GIRI Series; Bonamin, L.V., Waisse, S.: Cambridge Scholars Publishing: Cambridge, UK, 2019; vol. 1, Chapter 7, p. 104-127.

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Tanner Trust

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