Instructions

Activity 2 Openings

Instructions

Before you start

- create a tab and name it after yourself
- copy the content of the template tab into your tab

Round 1: sign up for two articles (10 minutes; by yourself)

- Go to the tab “Openings” to find article titles plus opening paragraphs
- Go to the tab “Sign-up” to distribute all articles within your group
    - use the table to assign two introductions to each team member based on everybody’s interest and expertise
    - make sure each article is assigned to at least one reader

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Round 2 (10 minutes; by yourself)

- Review
    - read two introductions and score them (excellent, good, adequate, poor) for how well each follows our guidelines for a strong opening paragraph

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Round 3 (10 minutes; group)

- Overall score: combine your team members’ individual scores to assign each article an overall score; which Intros are engaging versus less so?
    - **T**(top) | **H**(high) | **M**(medium) | **L**(low)
- Reflect: what made them rank higher or lower?

Summary table from all teams

- claim a column for your team and enter your team's letter scores

article	A	B	C	D	E	F	G	H	I	J
Campbell 2015										
Cornish-B 2002										
Dzidek 2017										
Hansen 2014										
Lochocki 2020										
Rognoni 2021										
Yan 2017										
Zhang 2017										

Round 4 (10 minutes; team)

- based on your rankings and notes, develop guidelines for what (not) to do when writing an opening paragraph

Openings

Openings

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1. Campbell 2015

The diffuse interstellar bands are absorption lines seen towards reddened stars. None of the molecules responsible for these bands have been conclusively identified. Two bands at 9,632 angstroms and 9,577 angstroms were reported in 1994, and were suggested to arise from C_{60}^+ molecules, on the basis of the proximity of these wavelengths to the absorption bands of C_{60}^+ measured in a neon matrix. Confirmation of this assignment requires the gas-phase spectrum of C_{60}^+. Here we report laboratory spectroscopy of C601 in the gas phase, cooled to 5.8 kelvin. The absorption spectrum has maxima at 9,632.76 0.1 angstroms and 9,577.56 0.1 angstroms, and the full widths at half-maximum of these bands are 2.26 0.2 a ̊ngstro ̈ms and 2.56 0.2 angstroms, respectively. We conclude that we have positively identified the diffuse interstellar bands at 9,632 ångströms and 9,577 angstroms as arising from C_{60}^+ in the interstellar medium.

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2. Cornish 2002

Enthalpy–entropy compensation: a phantom phenomenon

Enthalpy–entropy compensation is the name given to the correlation sometimes observed between the estimates of the enthalpy and entropy of a reaction obtained from temperature-dependence data. Although the mainly artefactual nature of this correlation has been known for many years, the subject enjoys periodical revivals, in part because of the frequent excellence of the correlation. As with other cases of impossibly good correlation between two biological variables, the explanation is that what purports to be two variables are very largely the same variable looked at in two different ways.

Enthalpy–entropy compensation enjoyed widespread popularity in the 1950s, even though it was soon shown (Exner 1964) to be largely derived from a statistical artefact of trying to extract two parameters from temperature-dependence data that could barely support one. Although it is now relatively rare in the literature, there have been occasional revivals: for example Gutfreund (1995) mentions it prominently in his book on biological kinetics, and it was the central theme in the book of Hochachka and Somero (1984) on biochemical adaptation. The basic observations are superficially straightforward and highly impressive: for example, the apparently excellent linear relationship between enthalpy and entropy of activation obtained by Johnson and Goldspink (1975) for the temperature dependences of the myofibrillar ATPases of various fishes, which provides the data for figure 7×5 of Gutfreund (1995). To avoid being misled into

seeing a real biological relationship where none exists, it is therefore important to understand how the artefactual correlation arises.

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3. Dzidek 2017

Why pens have rubbery grips

The process by which human fingers give rise to stable contacts with smooth, hard objects is surprisingly slow. Using high-resolution imaging, we found that, when pressed against glass, the actual contact made by finger pad ridges evolved over time following a first-order kinetics relationship. This evolution was the result of a two-stage coalescence process of microscopic junctions made between the keratin of the stratum corneum of the skin and the glass surface. This process was driven by the secretion of moisture from the sweat glands, since increased hydration in stratum corneum causes it to become softer. Saturation was typically reached within 20 s of loading the contact, regardless of the initial moisture state of the finger and of the normal force applied. Hence, the gross contact area, frequently used as a bench-
mark quantity in grip and perceptual studies, is a poor reflection of the actual contact mechanics that take place between human fingers and smooth, impermeable surfaces. In contrast, the formation of a steady-state contact area is almost instantaneous if the counter surface is soft relative to keratin in a dry state. It is for this reason that elastomers are commonly used to coat grip surfaces.

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4. Hansen 2014

Photocatalytic water oxidation at soft interfaces

Efficient photochemical water splitting is still a scientific challenge. The overall process consists of an oxidative and a reductive half reaction with the water oxidation step involving a four electron transfer and highly reactive oxygen intermediates being considered as particularly difficult. Heterogeneous and homogeneous photocatalysts have been developed. A typical homogeneous catalyst for photooxidation of water consists of two subunits: A light absorbing photoredox active dye or sensitizer and the water oxidizing catalyst. The two subunits can be covalently connected (Fig. 1,top), which ensures an efficient electron transfer, but requires the synthesis of complex ligands and linkers. If dye and oxidation catalyst are prepared as separate entities (Fig. 1, 4 and 5, bottom) different combinations can be easily realized, but the electron transfer between the subunits in homogeneous solution is diffusion controlled and depends on the concentration. In biological photosynthesis, chromophores and catalytic units are bound to membranes. Compared to homogeneous solution this two dimensional assembly increases the local concentration of the redox partners and shortens the average distance for electron transfer between them. Clustering of membrane embedded compounds and phase separation may

increase this effect further. Compared to covalently connected sensitizer–catalyst pairs, the assembly in fluid membranes remains dynamic allowing continuous self-assembly and reorganization of the catalytic subunits, which may be advantageous for the catalytic performance. Following this biological model we have prepared phospholipid membranes with co-embedded amphiphilic photosensitizers and water oxidation catalysts.

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5. Lochocki 2020

The search for a unique Raman signature of amyloid-beta plaques in human brain tissue from Alzheimer's disease patients

Aside from intracellular phosphorylated tau (pTau) deposits, extracellular accumulation of amyloid-beta into plaques is known as the main pathological hallmark in ex vivo brain tissue for the diagnosis of Alzheimer's disease. Aβ peptides are molecular chains split off from the amyloid precursor protein (APP) and they adopt predominantly a poorly soluble β-sheet conformation. As state of the art diagnosis, Aβ is targeted in cerebrospinal fluid (CSF) analysis and positron emission tomography (PET) is performed on in vitro and in vivo brain tissue. Furthermore, blood components and derivatives have been investigated for potential diagnosis of Alzheimer's disease using spectroscopic techniques. The former mentioned methods are, at least, partially invasive, time consuming and expensive. Nevertheless, even though these assessments are done in vivo and would aid the early diagnosis of AD, a conclusive assessment can only be done post-mortem. Ex vivo (immuno-)histochemical detection on brain tissue is carried out using staining with conventional anti-Aβ antibodies, Thioflavin-S2, or curcumin, a potential biomarker for the detection of Aβ plaques. In addition, pathological evidence of Aβ aggregates was observed in retinal tissue of mice and humans but could only be identified in human brain tissue by others. However, to identify Aβ deposits, the tissue often has to undergo a time-consuming staining procedure. Additionally, this could put the tissue under stress in terms of heat and deformation, which potentially alters the tissue structure or even leads to total tissue loss. Therefore, techniques such as FTIR-spectroscopy, Raman spectroscopy and its derivatives coherent anti-Stokes Raman scattering (CARS), stimulated Raman scattering (SRS) and surface-enhanced Raman spectroscopy (SERS) could offer a label-free and non-destructive characterization of the morphology of the tissue. Together with optical coherence tomography, these techniques could overcome the disadvantages of the staining procedure. Furthermore, these techniques could potentially lead to non-invasive in vivo detection and characterization of amyloid plaques e.g., in the retina.

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6. Rognoni 2021

How many water molecules are needed to solvate one?

The famous sorites paradox was first stated by Eubulides of Miletus in the 4th century B.C. In its original version it amounts to the question of down to which size a heap of sand can be still considered as such, when grains are removed one by one. A chemical-physical variant of the paradox can be formulated by counting how many water molecules make up the smallest water droplet, i.e. a supramolecular aggregate featuring the same properties as liquid water. Strictly related to this issue is the ubiquitous concept of solvation. Solvation is characterized by the nature of solute–solvent interactions, and often implies a structural reorganization of both. In the case of hydration, i.e. solvation performed by water, a specialized network of hydrogen bonds is built around the solute with solvent molecules arranged in shells. In practice, crucial phenomena like protein folding or reactivity in the condensed phase are strictly dependent on the mechanism of solvation. The structural organization of the solvent is also fundamental in explaining the hydrophobic force, sometimes described as the aggregation or desolvation of water repelling solutes that is thought to favor water-displacement equilibria when a ligand, such as a drug, approaches a receptor site in a hydrated protein. The principles of hydration are still debated with a constantly evolving consensus, which has moved over time from the original iceberg model to more recent and refined descriptions. Therefore, it is not an overstatement to affirm that the investigation of the spatial organization and number of water molecules needed to hydrate a central target species is of utmost importance and still an open issue.

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7. Yan 2017

Bottom-up precise synthesis of stable platinum dimers on graphene

Supported metal catalysts are among the most important categories of heterogeneous catalysts in many reactions including chemical upgrading, automobile exhaust treatment, Fischer-Tropsch synthesis, biomass conversions, and many other processes. Decreasing metal particle size is desirable for
improving metal utilization, since catalytic reactions take place on the surface of metal nanoparticles (NPs). When a metal cluster contains only a few metal atoms, it could have a discrete energy
band structure, tightly correlated with the number of metal atoms. Changing one atom in the ultrafine cluster might largely alter the electronic structure and drastically change its catalytic properties. Such atom-dependent catalytic behaviors have been successfully demonstrated by the model catalysts of mass-selected metal clusters, which were fabricated by soft landing of mass-selected ions from their physical vapor under ultrahigh vacuum conditions. However, such complicated approach is only

limited to model catalyst studies and is not applicable to high-surface area supports for practical applications.

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8. Zhang 2017

Energy-Related Small Molecule Activation Reactions: Oxygen Reduction and Hydrogen and Oxygen Evolution Reactions Catalyzed by Porphyrin- and Corrole-Based Systems

With the rapid depletion of fossil fuels dating back to the industrial revolution of the 18th century, humankind faces critical energy and environmental crises. On the basis of current reserve levels and the consumption level of fossil fuels, all the available resources on our planet will be inadequate to supply the global energy demand in a century or two. To reach the next level of technological advancement for our civilization, we must exploit clean and sustainable energy resources. Solar irradiation energy reaching earth far exceeds the energy needs for all human activities. The conversion and storage of solar energy in an efficient and cost-effective manner are subjects that attract great attention. Photosynthesis by green plants converts and stores solar energy in chemical form. In this process, water is effectively split into oxygen and hydrogen gases. Oxygen is released from cells, whereas hydrogen is captured in NAD(P)-H. Water splitting is a thermodynamically nonspontaneous process with a positive Gibbs free energy change of 237 kJ mol^{-1}. Thus, the combustion of hydrogen in fuel cells produces great free energy, and the only exhaust is recyclable water. These two reactions compose an ideal process to provide humankind with clean and sustainable energy. In such a process, hydrogen and oxygen evolution reactions (the redox reactions of water splitting) and an oxygen reduction reaction (the cathodic reaction of the hydrogen fuel cell) are key elements that affect the efficiency of the overall energy conversion. These energy-related small molecule activation reactions widely exist in biological processes. Scientists, inspired by nature, are trying to understand these processes to design efficient systems for energy conversion.

Sign-up

The Backcorner

Team members:

article	what to read	reader 1	reader 2
Campbell 2015	bolded 1st paragraph	Giorgia	Michelle
Cornish 2002	abstract and 1st paragraph	Rodolfo	Kimiya
Dzidek 2017	bolded 1st paragraph	Anna	Michelle
Hansen 2014	1st paragraph Introduction	Anna	Kimiya
Lochocki 2020	1st paragraph Introduction	Lana	Giorgia
Rognoni 2021	1st paragraph Introduction	Rodolfo	Anna
Yan 2017	1st paragraph Introduction	Kimiya	Lana
Zhang 2017	1st paragraph Introduction	Lana	Michelle

ElectroGirls

Team members:

article	what to read	reader 1	reader 2

Campbell 2015	bolded 1st paragraph	Aleksandra	Yidan
Cornish 2002	abstract and 1st paragraph	Maartje	
Dzidek 2017	bolded 1st paragraph	Nicci	Maartje
Hansen 2014	1st paragraph Introduction	Katinka	
Lochocki 2020	1st paragraph Introduction	Yidan	
Rognoni 2021	1st paragraph Introduction	Nicci	Katinka
Yan 2017	1st paragraph Introduction	Katinka	
Zhang 2017	1st paragraph Introduction	Aleksandra	Maartje

FunChem

Team members:

article	what to read	reader 1	reader 2
Campbell 2015	bolded 1st paragraph	Eline	Jari
Cornish 2002	abstract and 1st paragraph	Marco	Eline
Dzidek 2017	bolded 1st paragraph	Jari	Joost

Hansen 2014	1st paragraph Introduction	Marco	Joost
Lochocki 2020	1st paragraph Introduction	Floris	Caro
Rognoni 2021	1st paragraph Introduction	Floris	Eline
Yan 2017	1st paragraph Introduction	Jari	Caro
Zhang 2017	1st paragraph Introduction	Floris	Marco

The Leftovers and The Spectroscopists

Team members: Jordy, Karen, Anna, Max, Daan,

article	what to read	reader 1	reader 2
Campbell 2015	bolded 1st paragraph	Maëva	Jordy
Cornish 2002	abstract and 1st paragraph	Max	Anna
Dzidek 2017	bolded 1st paragraph	Daan	Anna
Hansen 2014	1st paragraph Introduction	Anna	Maëva
Lochocki 2020	1st paragraph Introduction	Max	Daan
Rognoni 2021	1st paragraph Introduction	Jordy	Karen
Yan 2017	1st paragraph	Karen	Max

	Introduction		
Zhang 2017	1st paragraph Introduction	Karen	Jordy

Vlot&Rot

Team members:

article	what to read	reader 1	reader 2
Campbell 2015	bolded 1st paragraph	Sebastian	Naomi
Cornish 2002	abstract and 1st paragraph	Sebastian	
Dzidek 2017	bolded 1st paragraph	Prashanth	
Hansen 2014	1st paragraph Introduction	Prashanth	
Lochocki 2020	1st paragraph Introduction	Harold	
Rognoni 2021	1st paragraph Introduction	Harold	Naomi
Yan 2017	1st paragraph Introduction	Pascale	
Zhang 2017	1st paragraph Introduction	Pascale	

PhotoTeam

Team members:

article	what to read	Daria	Lan	Joeri
Campbell 2015	bolded 1st paragraph	x		
Cornish 2002	abstract and 1st paragraph	x		
Dzidek 2017	bolded 1st paragraph		poor	
Hansen 2014	1st paragraph Introduction		good	
Lochocki 2020	1st paragraph Introduction			x
Rognoni 2021	1st paragraph Introduction			x
Yan 2017	1st paragraph Introduction	x		
Zhang 2017	1st paragraph Introduction			x

[Team name]

Team members:

article	what to read	reader 1	reader 2
Campbell 2015	bolded 1st paragraph		

Cornish 2002	abstract and 1st paragraph		
Dzidek 2017	bolded 1st paragraph		
Hansen 2014	1st paragraph Introduction		
Lochocki 2020	1st paragraph Introduction		
Rognoni 2021	1st paragraph Introduction		
Yan 2017	1st paragraph Introduction		
Zhang 2017	1st paragraph Introduction		

[Team name]

Team members:

article	what to read	reader 1	reader 2
Campbell 2015	bolded 1st paragraph		
Cornish 2002	abstract and 1st paragraph		
Dzidek 2017	bolded 1st paragraph		
Hansen 2014	1st paragraph Introduction		
Lochocki 2020	1st paragraph		

	Introduction		
Rognoni 2021	1st paragraph Introduction		
Yan 2017	1st paragraph Introduction		
Zhang 2017	1st paragraph Introduction		

[Team name]

Team members:

article	what to read	reader 1	reader 2
Campbell 2015	bolded 1st paragraph		
Cornish 2002	abstract and 1st paragraph		
Dzidek 2017	bolded 1st paragraph		
Hansen 2014	1st paragraph Introduction		
Lochocki 2020	1st paragraph Introduction		
Rognoni 2021	1st paragraph Introduction		
Yan 2017	1st paragraph Introduction		
Zhang 2017	1st paragraph Introduction		

Template

[your name]

Round 1 (10 minutes; team)

- Distribute reading
    - use the table below to assign two introductions to each team member based on everybody's interest and expertise
    - make sure each article is assigned to at least one reader

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Round 2 (10 minutes; by yourself)

- Review
    - read two introductions and score them (excellent, good, adequate, poor) for how well each follows our guidelines for a strong opening paragraph

criterion	**score**	**Notes**
article 1 (insert author and year here)		
opens without stating the obvious		
poses questions		
does not merely convey knowledge		
opens with something reader likely cares about		
demonstrates relevance to community		
article 2 (insert author and year here)		
opens without stating the obvious		
poses questions		
does not merely convey knowledge		

criterion	score	Notes
article 1 (insert author and year here)		
opens without stating the obvious		
poses questions		
does not merely convey knowledge		
opens with something reader likely cares about		
demonstrates relevance to community		
article 2 (insert author and year here)		
opens without stating the obvious		
opens with something reader likely cares about		
demonstrates relevance to community		

Round 3 (10 minutes; team)

- Overall score: combine your team members' individual scores to assign each article an overall score; which Intros are engaging versus less so?
    - **T**(top) | **H**(high) | **M**(medium) | **L**(low)
- Reflect: what made them rank higher or lower?

article	overall score (across team)	what pushed it up in ranking?	what pushed it down in ranking?
Campbell 2015			
Cornish-B 2002			

Dzidek 2017			
Hansen 2014			
Lochocki 2020			
Rognoni 2021			
Yan 2017			
Zhang 2017			

Round 4 (10 minutes; team)

- based on your rankings and notes, share your take-aways and guidelines for what (not) to do when writing an opening paragraph

Do’s, Don’ts and other takeaways

[your text here]