Sunscreen presentation

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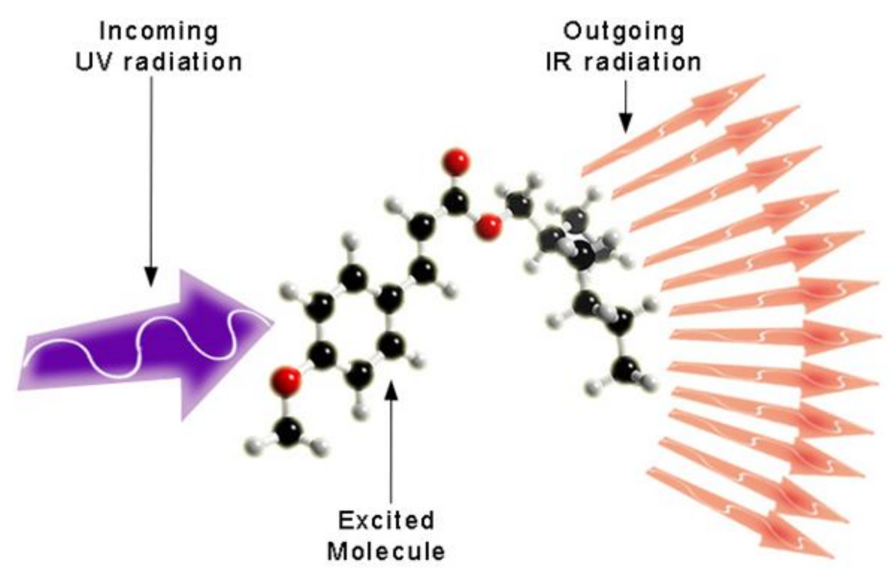
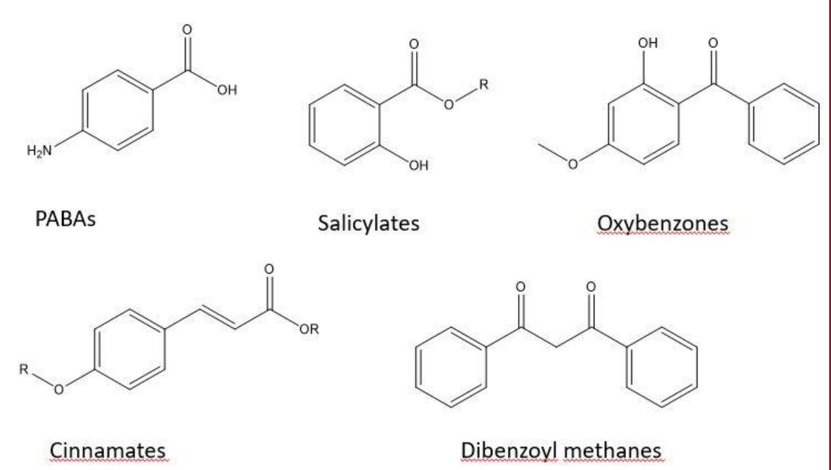
University of Minnesota
ROCHESTER

Background



- **Sunscreen molecules absorb ranges of UV light wavelengths that can be harmful to skin and emit then as IR wavelengths[1].**
- **Sunscreens that absorb UVC light absorbed wavelengths 200-250 nm, UVB light in the range 250-350 nm, and UVA between 350 and 400 nm[2].**
- **The five classes of sunscreen molecules are PABAs, Salicylates, Oxybenzones, Cinnamates, and dibenzoal methanes.**

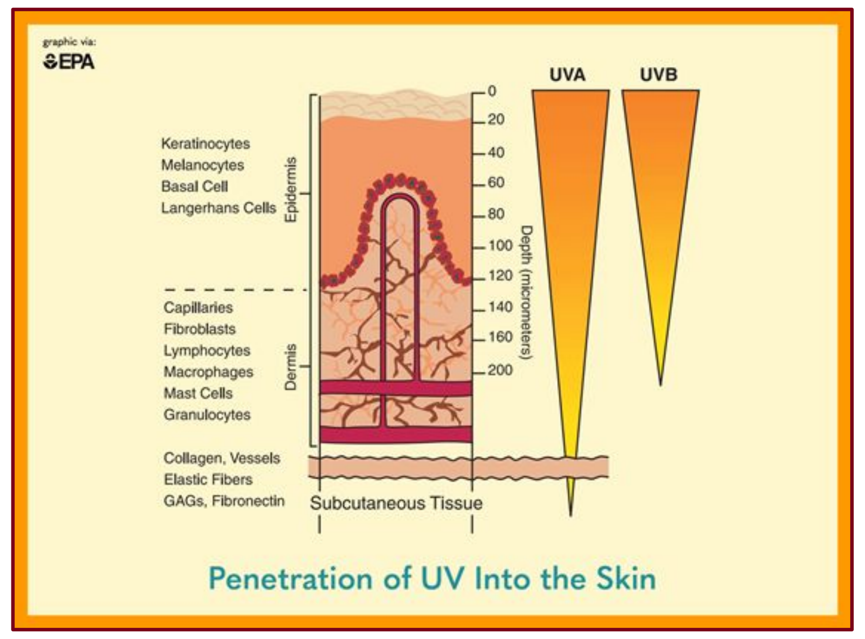


Why Sunscreens are Important

- **They prevent skin cancer, precancers, wrinkles, sagging and age spots[3]**
- **There are a lot of different types of sunscreens that are approved by the FDA, such sunscreen include Aminobenzoic acid, Avobenzone, Cinoxate and Dioxybenzone[4]**

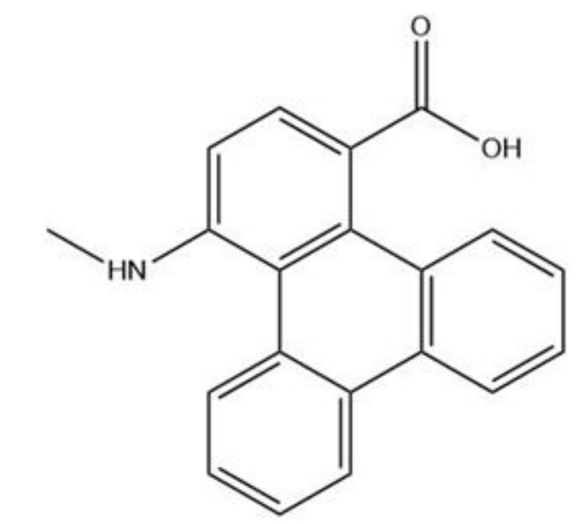
How they work on a molecular level

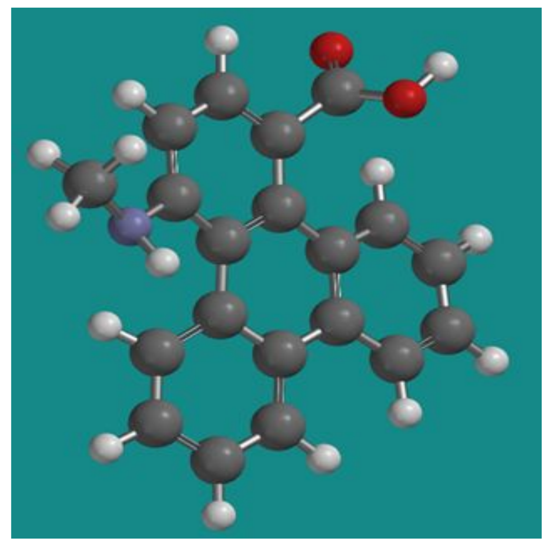
- **They can provide a barrier on the top of your skin to protect you from the sun[5]**
- **The structure of the sunscreen determines which uv light it covers [5]**
- **The structure also determines how often you have to apply and whether or not its waterproof[5]**



Discussion

Our designed sunscreen molecule is::





Our lambda max is calculated by:
Base: 230
Ortho benzene: 15
Meta benzene: 15
NH group: 58
Total lambda max: 318

Sunscreen Properties
-PABA Derivative
-Mostly Hydrophobic
-Will reflect UVA and UVB
-High extinction coefficient
-Mostly planar

Future Directions

Future directions for this project include:

- developing a safe and environmentally friendly way to synthesize our sunscreen molecule.
- Testing the chemical properties of the proposed molecule to make sure it will function as a sunscreen.
- Testing the proposed molecule for toxicity, consistency, and smell.

Factors to think about while designing a sunscreen

- **Toxicity**
  - **You would want a non-toxic sunscreen so that it doesn't make you sick.**
- **Skin membrane permeability**
  - **You want it to be skin membrane permeable so that it can act like a second skin.**
- **Smell**
  - **If scents bother you, you might want to pick out of scent free sunscreen.**
- **Hydrophobicity**
  - **You want it to be hydrophobic so that it doesn't wash away easily, be sweat or water**
- **Conjugation and lamda max**
  - **A good sunscreen covers UVA and UVB**
- **Stickiness**
  - **You want a non-sticky sunscreen so nothing sticks to you.**
- **Stable under various conditions**
  - **A sunscreen should be stable under the heat of the sun and in water.**
- **Extinction Coefficient**
  - **A high extinction coefficient in a sunscreen ensures that the molecule will absorb a large amount of light at a specified wavelength without disintegrating.**

Bibliography

[1]Adapted from http://www.3dchem.com/molecules.asp?ID=135#and http://members.aol.com/WSRNet/tut/absorbu.htm
[2]Adapted from http://www.3dchem.com/molecules.asp?ID=135#and http://members.aol.com/WSRNet/tut/absorbu.htm
[3]Retrieved from https://www.aad.org/sun-protection/sunscreen-faqs.
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[5] Daniellesays. (2015, June 26). The Science of Sunscreen & How it Protects Your Skin. Retrieved from https://www.compoundchem.com/2014/06/05/sunscreenchemicals/.