

name, λ (in nm)	γ and x 200nm	UV-C 280	UV-B 320	UV-A 400	V B G Y O R 700nm	IR
<b>RELATIVE ENERGY</b> PHOTON % in sunshine	highest	high	medium	low	lower	lowest (MICRO WAVE, RADIO)
type of rxn:	IONIZING, BREAKS BONDS OFF NUCLEAR	BREAKS BOND	BREAKS BOND	?	USUALLY NO RXN	later, "greenhouse" EFFECT
reaction(s) including any non-chemicals, over-the-arrow:	H <sub>2</sub> O → H <sup>+</sup> + OH <sup>-</sup> O <sub>2</sub> → O <sub>2</sub> <sup>+</sup> + O <sub>2</sub> <sup>-</sup>	O <sub>2</sub> → O + O O <sub>3</sub> → O <sub>2</sub> + O	O <sub>3</sub> → O <sub>2</sub> + O	Chapman Cycle is NATURAL, occurs without CFCs etc, but amounts of O, O <sub>2</sub> , O <sub>3</sub> , Cl <sub>2</sub> are affected by CFC	Na <sub>2</sub> O → Na + O	absorbs IR (CO <sub>2</sub> ...)
rxn's location & non-location		in STRATOSPHERE, not TROPOSPHERE	STRATOSPHERE (w/ lots of O <sub>3</sub> ) TROPOSPHERE (w/ low amounts of O <sub>3</sub> and UV-B)	net chemical result of Ch-Cycle is ZERO, but it absorbs UVB, UVC.	STRATOSPHERE (lighter alt) TROPOSPHERE (w/ chemicals: Na <sub>2</sub> O, Cl <sub>2</sub> , PLANTS)	See pg 104, FIG 3.2
skin-effects	(earlier) for Exam 1, hands of early radiologists (who didn't know the danger)	would damage LOGICALLY IF UV-C hits us (but not much does, so the IF)	causes SUN-BURN direct (surface, epidermis) DNA damage (LOW penetration) (in epidermis: F-8, #7f-8b) (body uses UV-B to make Vit D)	causes SUN-TAN penetrates deep → AGE-WRINKLES	not much effect?	we feel WARMTH (heat)
cancer-effects	(earlier) - IONIZ-RXNS → H <sub>2</sub> O <sup>+</sup> , OH <sup>-</sup> that damage DNA, → cell death (RADN SICKNESS)	doesn't occur THIS UV-C would be biologically damaging (to skin, eyes, ... a concern)	SKIN cancers: basal cell carcinoma (common), squamous cell (outer layer), melanoma (75% die)	some? due to those caused by UVA and/or UVB? SCIENTIFIC CONTROVERSY → for 108, I don't know what the answer is		
eye-effects	or damaged DNA cell (lives on as cancer) MAYBE some DNA damage → cancer		damage eye-STRUCTURE (cornea, lens)	burns eye-SURFACE	eye lets us see colors (with no damage?)	story w/ 2 ways to get CFC → PSC-chem → Cl <sub>2</sub> → O <sub>3</sub> ↓ CFC → Cl <sub>2</sub> → O <sub>3</sub> ↓
miscellaneous HEALTH HAZARDS: cancer (UV-C, UV-A), other (CO <sub>2</sub> , sulfates (CO <sub>2</sub> ), ACID RAIN, NO <sub>x</sub> , etc	probably 8X → damage to EYES		3-part SPLIT of UV-spectrum: C (280-315), B (315-400), A (400-500)	silver sword (shiny & reflective) ZnO reflects it (screen) (SUN * reflect → SUN SCREEN particles BLOCK)	dark (COLD) → PSC (Antarctic) no wind → Cl <sub>2</sub> , HOCl, CO, Cl <sub>2</sub> ← CFC + UV-C also EVERYWHERE, at all times	
light can be:	in fluorescence, ACE light is absorbed, some energy conserved, (converted to HEAT) and then emission;	metric prefixes: 529 kilo, km = 10 <sup>3</sup> m, centi, cm = 10 <sup>-2</sup> m, milli, mm = 10 <sup>-3</sup> m, nano, nm = 10 <sup>-9</sup> m	how do health-effects of UV-B, A depend on dark skin absorbs more skin color (melanin), men/women (why?) (outside more (average))	UV intensity varies w alt, lat, O <sub>3</sub> (CLEAR) (CLOUDS) time of DAY (OUTSIDE (INSIDE) REFLECT (SWIMMING POOL WATER))	Cl <sub>2</sub> is CATALYST for CYCLE (90-91) that 2 times	lots of O <sub>3</sub> O <sub>2</sub> + O <sub>3</sub> (above 15-30 km) mainly O <sub>2</sub> -18mi O <sub>3</sub> LAYER 15-30km -9mi
Is it a radical? K yes, K <sup>+</sup> no, H <sub>2</sub> O no, H <sub>2</sub> O <sup>+</sup> y, Cl y, Cl <sub>2</sub> no Cl <sup>-</sup> , O <sup>-</sup> no, O <sub>2</sub> no, NO <sub>2</sub> y, SO <sub>2</sub> no, OH no, OH <sup>+</sup> y	optical brightener abs 350, emit 430 Why does it "undo the dinginess"? It adds back the blues (higher part of vis spectrum) that absorbed by dyes originally (WHITE = all vis colors) reflected or emitted by dyes	both transmit thru QRTZ but UV stopped by GLASS (absorbed)	FORMULAS chemical, C <sub>3</sub> H <sub>8</sub> O condensed structural, C <sub>3</sub> H <sub>7</sub> OH structural, Lewis (= structural with el dots on all but C, H)	CRITICAL THINKING: all of these are same CONNECTIVITY. FORMULAS more detail: CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> OH pentane geometry (pentagon...)	[M] <sup>+</sup> , [O] <sup>2-</sup> IONIC COMPOUND WITH IONS METAL with NON-METAL (H <sub>2</sub> O) duet, octet COVALENT MOLECULE w/ NON-METALS	free radicals (like NO, NO <sub>2</sub> ) very reactive

HEALTH EFFECTS

I.R.

ALPHABETIC: Br, Cl, F

gas at room-T (but VOLATILE) as in VOCs

each bond is 1.5 so breaks easier (w/ UV-B) compared w/ O<sub>2</sub>'s bond of 2.0