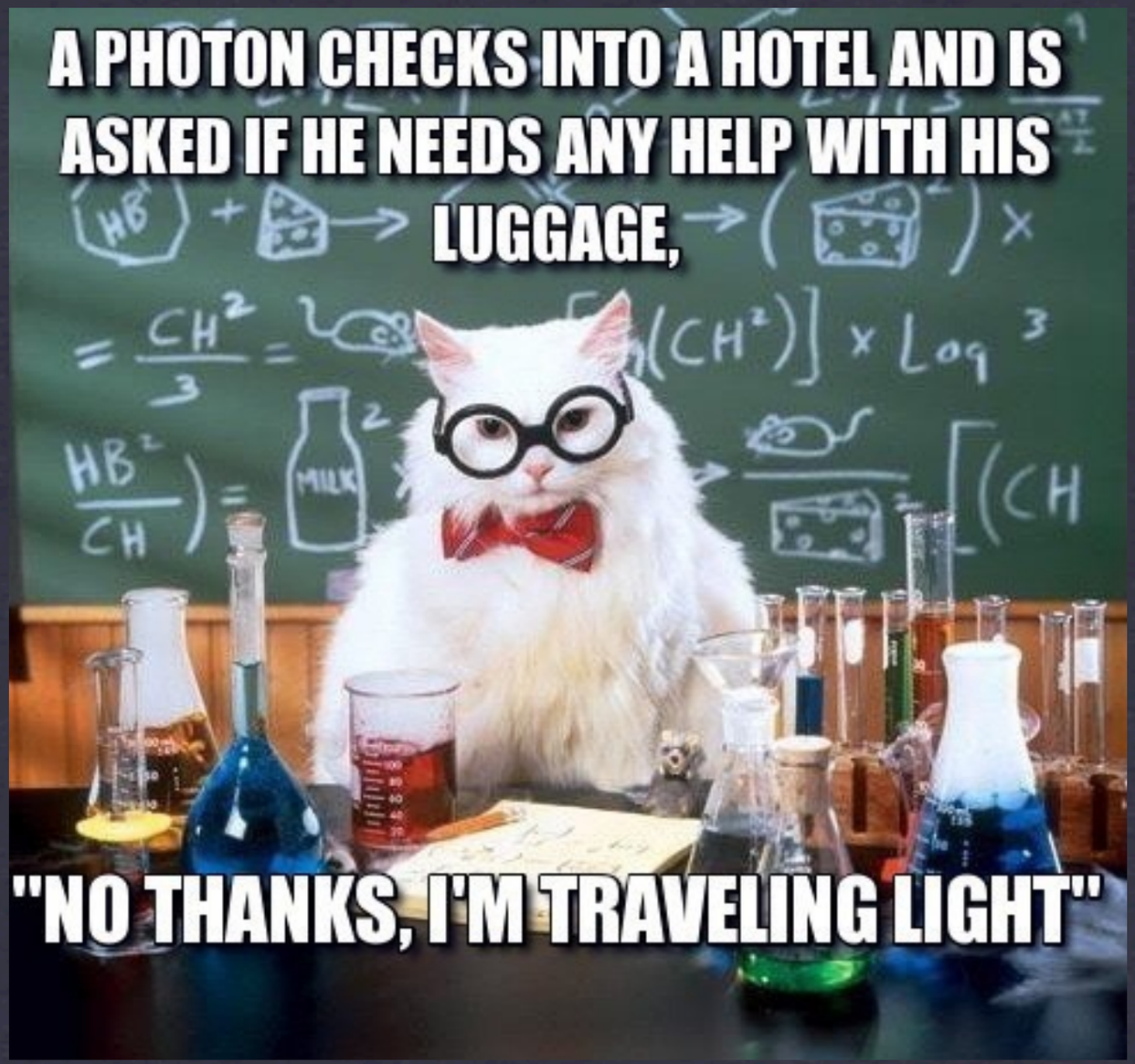
Atomic Structure

Electron configuration

Wednesday

10/14/15



Agenda

- **Homework Peer-Grading: Energy of waves calculations**
- **Assign text books.**

Do on a separate piece of paper…

- KXL a local am radio station broadcasts on a frequency of 750 kilohertz. (750,000 s^{-1}) Calculate the wavelength and energy of the radio wave emitted by KXL.
- Ultra violet radiation from the sun is often quite intense in the range of 320-400 nanometers. Calculate the frequency and energy of UV radiation if its wavelength is 360 nm.
- An argon laser emits light with a wavelength of 489 nm. Calculate its energy in kilojoules per mole.
- A laser emits light with a frequency of 4.69 x 1014 s^{-1}. Calculate its energy in kilojoules per mole
- In a spectra experiment, a line for the red line of hydrogen was recorded at 645 nm. Calculate its frequency and energy in kJ per mole.

Answers

1. $c=\nu\lambda$ $\lambda=c/\nu$

$\lambda=3.00 \times 10^{8}\ m\ s^{-1} / 7.50 \times 10^{5}\ s^{-1} = 0.400 \times 10^{3} =$ **4.00×10^{2} m or 400 m**

$E = h\nu = (6.63 \times 10^{-34}\ J\ s) \times (7.50 \times 10^{5}\ s^{-1}) = 49.695 \times 10^{-29} =$ **4.97×10^{-28} J**

2 $\nu = c/\lambda$

$\nu = 3.00 \times 10^{8}\ m\ s^{-1} / 360 \times 10^{-9}\ m = 0.008333 \times 10^{17}\ s^{-1} =$ **$8.33 \times 10^{14}\ s^{-1}$**

$E = h\nu = (6.63 \times 10^{-34}\ J\ s) \times (8.33 \times 10^{14}\ s^{-1}) = 55.21 \times 10^{-20}\ J =$ **5.52×10^{-19} J**

3 $E = hc/\lambda$

$= (6.63 \times 10^{-34}\ J\ s)(3.00 \times 10^{8}\ m\ s^{-1})(6.022 \times 10^{23}\ mol^{-1})(10^{-3}\ kJ/J)/489 \times 10^{-9}\ m$

$= 0.2448 \times 10^{3}\ kJ\ mol^{-1} =$ **$245\ kJ\ mol^{-1}$**

4. $E = h\nu = (6.63 \times 10^{-34}\ J\ s) \times (4.69 \times 10^{14}\ s^{-1})(6.022 \times 10^{23}\ mol^{-1})(10^{-3}\ kJ/J)$

$E =$ **$187\ kJ\ mol^{-1}$**

5.. $\nu = c/\lambda$

$\nu = 3.00 \times 10^{8}\ m\ s^{-1} / 645 \times 10^{-9}\ m = 0.00465 \times 10^{17}\ s^{-1} =$ **$4.65 \times 10^{14}\ s^{-1}$**

$E = h\nu = (6.626 \times 10^{-34}\ J\ s) \times (4.65 \times 10^{14}\ s^{-1}) = 30.81 \times 10^{-20}\ J = 3.08 \times 10^{-19}\ J$

$(3.08 \times 10^{-19}\ J)(6.022 \times 10^{23})/(1000\ J\ kJ^{-1}) = 18.5 \times 10 =$ **$185\ kJ\ mol^{-1}$**

Reading in Textbook

DUE MONDAY NOVEMBER 2ND

- Read pages 303-331
- Answer questions starting on Page 333
- 1, 3, 6, 8, 9, 10, 11, 12, 13, 19, 22, 23, 31, 32, 33, 34, 35, 40, 41, 42, 47, 48, 49, 50, 60, 70, 73, 79, 80, 81
- *I will randomly select 15 problems to grade*