Atomic Structure and Spectra Lab Report

Dixie State University

Chemistry 1215-50

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Results:

The table below shows the chemicals that were burned and the color of the flame when being burned.

Chemical	Color of Flame
0.1M $BaCl_2$	Light Yellow
0.1M $CaCl_2$	Green
0.1M $CuCl_2$	Teal
0.1M KCl	Violet
0.1M LiCl	Red
0.1M NaCl	Orange
0.1M $SrCl_2$	Red
Unknown #1	Orange
Unknown #2	Yellow
Unknown #3	Violet

Through comparison, we are able to see that Unknown #1 is most likely NaCl, Unknown #2 is most likely $BaCl_2$ and Unknown #3 is most likely KCl.

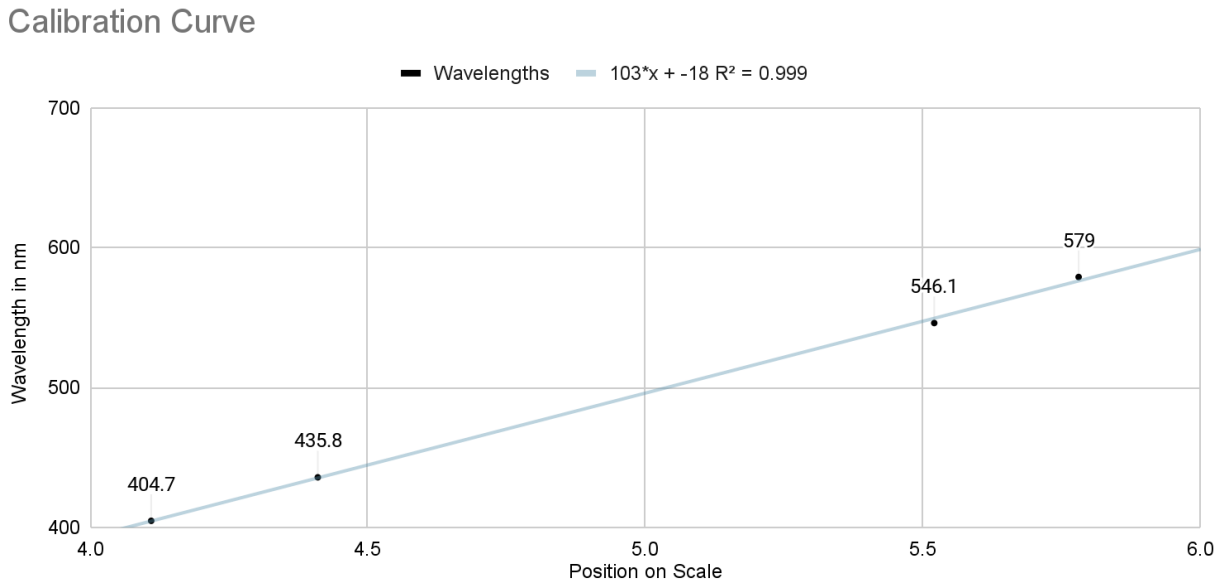
Results:

Mercury Spectroscope Calibration

Color	Wavelength	Position on scale
Violet	404.7 nm	4.11
Blue	435.8 nm	4.41
Green	546.1 nm	5.52
Yellow	579.0 nm	5.78

Equation 1:

Y = 103 * x - 18



Hydrogen Emission Spectrum

Color	Position on Scale	Wavelength Using Calibration Curve (y = 103 * x - 18)	Assignment (n-level)
Violet	4.43	103 * 4.43 - 18 = 438 nm	5
Teal	4.95	103 * 4.95 - 18 = 492 nm	4
Yellow	5.72	103 * 5.72 - 18 = 571 nm	3
Red	6.57	103 * 6.57 - 18 = 659 nm	3

Results:

Equation 2 Calculations:

$E = -R_H * [(1/n^2_{final}) - (1/n^2_{initial})]$ and $R_H = 2.18*10^{-18}$

6 -> 2 $E = -R_H * [(1/2^2) - (1/6^2)] = 4.84 * 10^{-19}$ J

5 -> 2 $E = -R_H * [(1/2^2) - (1/5^2)] = 4.58 * 10^{-19}$ J

4 -> 2 $E = -R_H * [(1/2^2) - (1/4^2)] = 4.09 * 10^{-19}$ J

3 -> 2 $E = -R_H * [(1/2^2) - (1/3^2)] = 3.03 * 10^{-19}$ J

Equation 3 Calculations:

E=hc/wavelength, $h=6.626*10^{-34}$, $c=3.03*10^8$

$E_{Violet} = hc/438 * 10^{-9}$ m $= 4.58 * 10^{-19}$ J (5 -> 2 transition)

$E_{Teal} = hc/492 * 10^{-9}$ m $= 4.08 * 10^{-19}$ J (probably a 4 -> 2 transition)

$E_{Yellow} = hc/571 * 10^{-9}$ m $= 3.52 * 10^{-19}$ J (probably a 3 -> 2 transition)

$E_{Red} = hc/659 * 10^{-9}$ m $= 3.05 * 10^{-19}$ J (3 -> 2 transition)