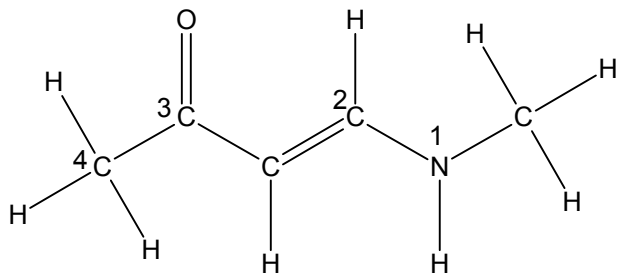


Supplemental Final Exam Practice

1. Calculate the K_a value for a .010M weak monoprotic acid in that is 1.1% ionized
2. Predict the molecular geometry and bond angles with respect to the numbered atoms



3. What is the molarity of a hydroiodic acid solution with a pOH of 8.5?
4. How many photons are emitted from a 25.0Watt light source of wavelength 625nm if it runs for 55.0min?
5. In the reduction of copper 2+ ions from an electrolytic process, how many moles of copper can be produced from a 200.mA current flowing for 7.00hours?
6. Write the skeletal structure for the organic compound 4-ethyl-2,2,3-trimethylhexane. How many hydrogens does this molecule contain?
7. Write the reduction half-reaction for the electrolysis of molten potassium chloride salt to potassium metal and chlorine gas.
8. What is the resulting pH after combining 50.0mL of .114M KOH with 60.0mL of .0800M HNO_3 ?

Answers:

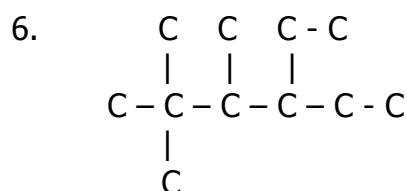
1. $(.010M)(.011) = 1.1 \times 10^{-4} \text{ mol}$
 $K_a = (1.1 \times 10^{-4})^2 / (.010 - 1.1 \times 10^{-4}) = \mathbf{1.2 \times 10^{-6}}$

2. 1. Trigonal pyramidal, ~ 109.5 ; 2. Trigonal planar, 120; 3. Trigonal planar, 120; 4. Tetrahedral, 109.5

3. $\text{pH} = 14.0 - 8.5 = 5.5$ $[\text{H}_3\text{O}^+] = [\text{HI}] = 10^{-5.5} = \mathbf{3.2 \times 10^{-6} \text{ M}}$

4. $25.0 \text{ J/s} (3300 \text{ s}) = 82500 \text{ J}$ $E = hc/\lambda = (6.626 \times 10^{-34})(3.00 \times 10^8 \text{ m/s}) / (6.25 \times 10^{-7} \text{ m}) = 3.18 \times 10^{-19} \text{ J/photon}$
 $\text{photons} = 82500 \text{ J} / (3.18 \times 10^{-19} \text{ J/photon}) = \mathbf{2.59 \times 10^{23} \text{ photons}}$

5. $.200 \text{ C/s} (25,200 \text{ s}) = 5040 \text{ C}$ $5040 \text{ C} / (96,480 \text{ C/mol } e^-) = .0522 \text{ mol } e^-$
 $.0522 \text{ mol } e^- (1 \text{ mol Cu} / 2 \text{ mol } e^-) = \mathbf{.0261 \text{ mol Cu}}$



24 hydrogens



8. moles of KOH = $(.0500 \text{ L})(.114 \text{ M}) = .00570 \text{ mol KOH}$
Mol HNO₃ = $(.0600 \text{ L})(.0800 \text{ M}) = .00480 \text{ mol HNO}_3$
Net difference = $.00570 - .00480 = .00090 \text{ mol KOH in excess}$
 $\text{pOH} = -\log(.00090 / .110 \text{ L}) = 2.087 = 2.1$
 $\text{pH} = 14.0 - 2.1 = \mathbf{11.9}$