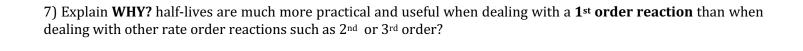
Exam 1A: Chemistry 102 (Spring 2021) Name: PRINT					
1-2) An aqueous solution is 35.00% by mass methanol, CH ₃ OH (32.04 g/mol) has a density of 0.836 g/mL The Molality and Molarity of Methanol in the solution is? (10 pts.)					
3) Based upon the assigned video, what is re	quired WITHIN the cell for the cell to o	distinguish a virus from necessary			
proteins? (1-3 words)					
Gases dissolved in H20 @ 298K	Molar Mass(g/mol)	k _H (mol L ⁻¹ atm ⁻¹)			
Oxygen (O ₂)	32.9978	0.001300			
Nitrogen (N2)	28.0134	0.006101			
4) Air at the top of Everest is approximately 18 % Oxygen and 82% Nitrogen gases by weight (largely because of N_2 being lighter than O_2), what would be the total concentration of air in g/L or air dissolved in water at the top of Mount Everest where total pressure is approximately 350 torr?					
5) How does the virus finally get into the nucleus of the cell? (One sentence)					
6) In a Second Order Reaction the Initial co					
microseconds. What is the rate constant for	or this reaction in units of Moles, Lit	ers ana seconas?			



8) In a research experiment, a new non-electrolytic compound was synthesized and it was found that when 23.25 grams was dissolved in cyclohexane up 420.0 mL of solution, the Osmotic Pressure generated was 420.5 torr at 37° C. Assuming the compound was nonvolatile (doesn't dissociate), what is the estimated **molecular weight** determined for this compound?

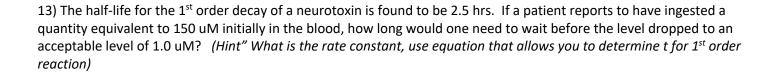
9) Explain using the Boltzmann Distribution why : (be concise one or two sentences for each MAX) **Evaporation is a cooling Process**

10-11) The following initial rate data are for the Oxidation of Ruminate ion by Molybdenum (IV) ion in aqueous solution: $PbO_3^{3-} + 2 Mo^{4+} + H_2O \longrightarrow PbO_4^{3-} + 2 Mo^{3+} + 2 H^+$ (10 pts)

Experiment	[PbO ₃ ³⁻] _o , M	[Mo ⁴⁺] _o , M	Initial Rate, Ms ⁻¹
EXPERIMENT 1	0.270	0.243	5.01E-06
EXPERIMENT 2	0.540	0.243	4.01E-05
EXPERIMENT 3	0.270	0.1215	1.25E-06
EXPERIMENT 4	0.540	0.486	1.60E-04

What is the **determined Rate Law** for the above reaction, including the value of the rate constant k?

12) The reaction of mercury (II) bromide with oxalate ion: 2 HgBr ₂ + C ₂ O ₄ ²⁻ 2 Br ⁻ + Hg ₂ Br ₂ + 2 CO ₂				
is found to be 1st order in HgBr2 and 2nd order in oxalate. In an experiment to determine the rate law, the rate constant				
was determined to be $1.45 \times 10^{-2} \text{M}^{-2} \text{s}^{-1}$. Using this information, the RATE of the reaction when $[\text{HgBr}_2] = 234 \text{mM}$ and				
$[C_2O_4^{2-}]$ = 317 mM would be? Hint be careful with consistency of units.				



14) The **half-life** of radioactive 131 I is 8.02 days. What is the rate constant for this first order decay? How long would it take for **75%** of 22.5 microgram/cc of 131 I₂ to decay away?

15-16) The solvent for an organic reaction is prepared by mixing 250.0 ml of acetone (C_3H_6O) with 150.0ml of Cyclohexane (C_6H_{12}). This mixture is stored at 22.0 C. The vapor pressure and the densities for the two pure components at 22.0 C are given in the following table. What is the vapor pressure of the total stored mixture?

Compound	Molar Mass g mol ⁻¹	Vapor pressure (torr)	Density g/ml
Cyclohexane	84.16	89.12	0.779
Acetone	58.08	201.57	0.791