

You should be successful on exam 1, if you can do the following in addition to the chem. 101 skills.

THERMODYNAMICS

NOTE: Objectives 1-8 from chem. 101-will be quickly reviewed

1. I.D. endothermic & exothermic rxns Unit 5, Sections 1-6
2. Define calorie, Calorie, joule. Convert between these units
3. Use 3 of these to calculate the 4th (q, m, s, ΔT)
4. Describe the differences between heat and temperature
5. Predict and calculate changes in internal energy, work, heat
6. Predict ΔH_{rxn} in processes (+, - or ≈ 0)
7. Recognize standard state, standard conditions and state functions
8. Calculate ΔH_{rxn} using:
 - Heating/cooling curves, • by combining known ΔH_{rxn} values,
 - calorimetry, • by using bond energies, 8.3
 - ΔH_f° , • by proportionalityUnit 19, Sections 1-3
omit 19.3c and 19.3d
9. Define spontaneity and ID spontaneous processes without calculations
10. Explain why entropy changes with temperature, phase change, etc.
11. Predict ΔS in processes (+, - or ≈ 0)
12. Calculate ΔS using S° values
13. Explain relationship between entropy and enthalpy (Gibbs);
14. Predict ΔG in processes
15. Find the temperature range at which a reaction is spontaneous
16. Calculate ΔG using ΔG_f° of products & reactants and using Gibbs equation; relate this to spontaneity

SOLUTIONS -Unit 13, Sections 1-5

1. Define & Calculate M, m, %wt, mole fraction, ppm, N
2. Describe dissolving at the particle level & the characteristics of solutions
3. Describe interactions, energy changes, role of disorder in the solution process
4. Predict if certain compounds will dissolve in specific solvents
5. Describe & calculate the effect of solution concentration on vapor pressure, b.p., f.p., & osmotic pressure of a solution

KINETICS -Unit 14, Sections 1-6

1. Give the rate of reaction in terms of reactant and product concentration variations
2. Calculate aver. rate, given $[]_i$, $[]_f$, t_f , and t_i
3. Calculate instantaneous rate from a graph of $[]$ vs. time
4. Explain the factors that affect rxn rates.
5. Explain the meaning of "rate constant" & state the units
6. Determine the rate law and overall order from experimental results (vv)
7. Calculate rate, rate constant, or reactant conc. given rate law + 2 of these
8. Calculate $[A]$, $[A]_0$, k, or t given 3 of 4
9. Explain & calculate relationship between $t_{1/2}$ & k for zero, 1st, and 2nd order rxn
10. Use graphing to determine zero, 1st, or 2nd order
11. Find E_a , ΔE from energy profile & define each
12. Use collision theory to explain temperature & concentration dependence
13. Describe the effects of a catalyst on energy requirements
14. Use the Arrhenius equation to relate activation energy to changing temp. & rate constants
15. ID elementary step, overall rxn, and rate determining step
16. Derive Rate law given elementary steps & their speeds or overall rxn
17. ID a catalyst and an intermediate in a mechanism