Ap chem final 2018 answers.

1 D 2. B 3. B 4. A 5. A 6. C 7. B 8. B 9. D

10. C. 11. D. 12. A 13. C 14. B 15. B ( and the question should say “base your answers to questions 15 TO 16 on the following:”

16. B 17. A 18.C 19. D 20. A 21. A 22. B 23. B 24. A

25. A 26. C 27. C 28. A 29. D 30. B 31. C 32. A 33. A 34. B

35. A

Long answers.

1. 0.500 M ( 0.10000 L)( 158 g/mol) = 7.90 g

b. They all contain 0.500 M x 0.005L = 0.00250 mol.

 NaOCl is the limiting factor. (many ways to show this. 0.00250 mol of NaOCl would require only 0.00125 mol of NaOH, and we have more than that. Same for Na2S2O3. Or, if we divide each number of moles by the coefficient of that reactant, NaOCl comes out smallest)

c) 12.4 degrees

d) 12.4° x 3.94 J/g° x 15.21 g = 743 J

 ii. Since the reaction is exothermic, ∆H must be NEGATIVE.

 ∆H = - 743 J/ (0.00250 mol NaOCl) = - 1.48 x 105 J/ mol NaOCl.

 But the questions asks for kJ/ mol rxn. There are FOUR moles of NaOCl per mol rxn. So, (-1.48 x 105 J/mol NaOCl) ( 4 mol NaOCl/1 mol rxn)( 1 kJ/1000 J) = -594 kJ/mol rxn.

( d ii is hard!!! )

e) The same. 32.4°C. Double the volume produces double the energy, but it also doubles the mass, and in Q = mc∆t, If both Q and m are doubled, ∆t stays the same.

f) The q will be twice as much, but so will the moles, so heat per mol won’t change.

2. ∆G = ∆ H - T ∆S. – 197 kJ/mol = ∆H - 298 K ( 0.144 kJ/mol K)

∆H = -154 kJ/ mol rxn

b) The temperature increases, because a – value of ∆H indicates an exothermic reaction, which releases heat to the surroundings.

c) Since ∆G° is - in sign, the reaction is favored.

d) find the moles of O2 desired. 0.990 atm ( 0.0500 L) /(0.0821 L atm/mol K)(298 K) = 0.00202 mole of O2. In the balanced equation, moles H2O2 = moles O2, so they are 0.00202 moles. 0.00202 mol ( 1.00L/0.900 mol) = 0.00224 L or 2.24 mL. ( maybe more simply, M = mol/L, so L = mol/M, or 0.00202mol/.900M

e) 46.5/50.0 x 100 = 93 %

f) No. There must be water vapor there.

3. XeF2 is trig. bipyramid, BeI2 is linear, and ICl2- is the same as XeF2, trig. bipyr.

 b) the I should be in the center, with two bonding pairs shared with the chlorine, and three lone pairs.

c) The I is -1.

4. Reactants: One C-C = 348 One C=C = 614 6 C-H = 6 x 413. One H-Cl 431

 Products. 7 C-H = 7 x 413. 2 C-C = 2x 348 1 C-Cl = 328.

 ∆H = Bond energy of reactants – bond energy of products, = - 44 kJ.

 ( or, one can see that one C=C breaks to form a C-C, An H-Cl bond breaks, and a C-H and C-Cl form. So 614 and 431 to break bonds. 348, 328, and 413 given off in forming bonds. = -44 kJ. )

b) 304 - 187 - 267 = - 150 J/mol K

ii. Using the ∆H from part b, ∆ G = -44kJ - 298(-0.150 kJ) = 0.70 kJ/mol.

5. There is a gas in the product, so the entropy change should be +.

Also, there should have been a state indicated for the Cu(NO3)(aq)

b) 2(90) + 3(-102) + 4 ( -286) - ( 8 x -207 ) Products minus reactants, and the Cu has a ∆Hf of 0 . ∆H is + 386 kJ/mol

c) Since the ∆H value is +, which is unfavorable, while the ∆S is +, which is favorable, the reaction is favored at HIGH temperatures, where T∆S will be greater than ∆H, so ∆G will be negative.

Also acceptable is simply that endothermic reactions are favored most by high temperatures, and since this reaction is endothermic, it is more likely to be favored at a higher temperature.