Polytechnic Tutoring Center
Midterm II REVIEW – CM 1014, Fall 2020

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The Exam is designed to test concepts, not exact knowledge so please do not worry if some questions seem outside of what you have learned. Watch the solution video when uploaded to see the method of solving each of these problems. The main focus is to understand the approach to problem solving

ANSWER KEY

Section 1: LONG ANSWER

1. We recognize that K_3PO_4 and $Ca[NO_3]_2$ are both ionic, try to find the cation (+ ion) and the anion (-) for each one
   a. Two ionic compounds trading partners means it is double replacement
   b. Everything ionic breaks up

   $6K^+ (aq) + 2PO_4^{3-} (aq) + 3Ca^{2+}(aq) + 6NO_3^- (aq) \rightarrow Ca_3[PO_4]_2(s) + 6K^+ (aq) + 6NO_3^-(aq)$

   c. Everything that is the same on both sides, cross out!

   $2PO_4^{3-} (aq) + 3Ca^{2+}(aq) \rightarrow Ca_3[PO_4]_2(s)$

2. It didn't ask for ionic so we'll write everything out:
   a. $H_2SO_4(aq) + 2NaOH(aq) \rightarrow 2H_2O(l) + Na_2SO_4(aq)$
   b. Using mV = mV and then dividing by 2 moles we find the acid is 1.2 M

3. Calculate the heat released using $q=ms\Delta t$, where m is the total mass of both liquids, s is the heat capacity, and delta t is the change in temperature. Find the number of moles of HBr that reacted, and divide q by this number for heat per mole. Answer is 56.01 KJ

Section 2: SHORT ANSWER
1. B, most ideal at high temperatures low pressures
2. D, sum of products - sum of reactants, atomic elements have no Hf
3. B, convert to moles, multiply by kJ per mole
4. B, Na is +1, O2 is -2, entire compound is 0. Solve for N
5. D, $q=ms\Delta t$
6. C, acid base forms salt and water
7. C, ideal gas equation PV=nRT R=0.082057
8. D, try writing an ideal gas equation for start and final states and solve for P_{final}
9. C, look for strong acids/bases and ionic compounds

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10. C, find mole fractions to solve for partial pressures
11. B, M1V1=M2V2
12. A, molarity is moles per liter, convert to moles and divide
13. D, $E = q + w$, work and heat lost by system is negative
14. B, Net ionic Equation has spectators canceled out and ionic compounds dissociated
15. A, lightest gas
16. A, Cu starts from 0, becomes +2
17. A, temperature is a measure of kinetic energy, not speed. $KE = (½)mv^2$ so highest v means lowest m
18. B, products minus reactants, don't forget to multiply by coefficient