

Review for Final CP/Honors Chemistry Calculations

1. $[\text{OH}^-] = 4.7 \times 10^{-4} \text{ M}$

$$\text{pOH} = -\log[\text{OH}^-] = 3.33$$

$$\text{pH} = 14 - \text{pOH} = 10.67$$

$$\text{pH} = -\log[\text{H}^+]; [\text{H}^+] = 2.1 \times 10^{-11} \text{ M}$$

2. $q = mH_f$

$$= 40.0 \text{ g} (334 \text{ J/g}) = 13360 \text{ J} = 13,400 \text{ J}$$

3. $q = mc\Delta T$

$$= (5.00 \text{ g}) (4.18 \text{ J/g}^\circ\text{C}) (30.3^\circ\text{C}) = 633.27 \text{ J} = 633 \text{ J}$$

4. $D = \frac{m}{V}$

$$3.87 \text{ g/cm}^3 = \frac{68.5 \text{ g}}{V} \quad V = 17.7 \text{ cm}^3$$

5. $(106 \text{ amu})(0.150) + 108(0.500) + 109(0.350) = 108.05 \text{ amu}$

6. $\% \text{ Cl} = \frac{\text{mass Chlorine}}{\text{total mass}} \times 100$
 $= \frac{35.5}{106.6} \times 100 = 33.3\% \text{ Cl}$

7. $\% \text{ H}_2\text{O} = \frac{5(18.0)}{249.6} \times 100 = 36.1\% \text{ H}_2\text{O}$

8. a) $3.50 \text{ g} + 8.4 \text{ g} = 11.9 \text{ g}$

b) $2.05 \text{ g} / 7.3 \text{ mL} = 0.28 \text{ g/mL}$

9. $M_A V_A = M_B V_B$

$$M_A (25.0 \text{ mL}) = (0.500 \text{ M}) (59.1 \text{ mL})$$

$$M_A = 1.18 \text{ M}$$

10. $Al(OH)_3$ molar mass = 78.0 g/mol

11. $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$ $\frac{(575.0 \text{ kPa})(500.0 \text{ mL})}{(313 \text{ K})} = \frac{P_2 (400.0 \text{ mL})}{(318 \text{ K})}$

$P_2 = 730.2 \text{ kPa}$

12. $\frac{70 \text{ amu}}{14 \text{ amu}} = 5$

(mass of empirical formula)

Molecular formula = C_5H_{10}

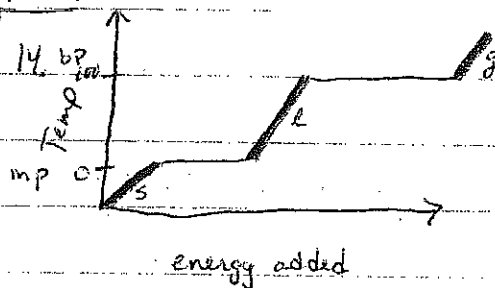
13. $PV = nRT$

$50.0 \text{ g } N_2 \times \frac{1 \text{ mol } N_2}{28.0 \text{ g } N_2} = 1.79 \text{ mol } N_2$

$(1 \text{ atm})(V) = (1.79 \text{ mol})(0.0821 \frac{\text{L}\cdot\text{atm}}{\text{K}\cdot\text{mol}})(273 \text{ K})$

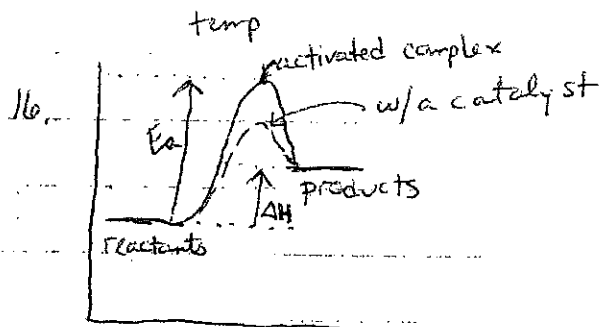
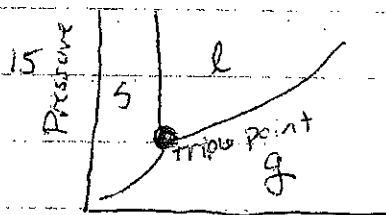
$V = 40.1 \text{ L}$

Diagrams



bold areas are where PE remains the same, but KE increases

non-bold areas are where KE remains the same and PE increases



17. a) $\approx 23\text{g}$
b) $\approx 27^\circ\text{C}$
c) unsaturated

Miscellaneous

18. a) $K_{eq} = \frac{[D]}{[A][B]^3}$

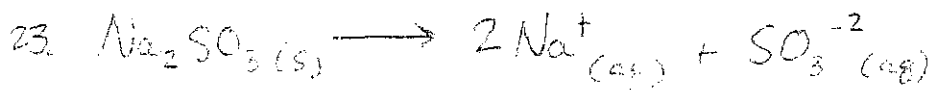
- b) $[D]$ will decrease
c) Forward (to the right)
d) $[A]$ will decrease

19. • Increase the temp of the H_2O
• Crush the tablet to increase the surface area
• (Add a catalyst)
• (Stir the mixture)

20. a) physical d) chemical
b) chemical e) chemical
c) physical f) physical

21. a) $\text{CO}_2(\text{s}) \rightarrow \text{CO}_2(\text{g})$
c) $\text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{s}) \rightarrow \text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{aq})$
f) $\text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{O}(\text{s})$

22. Freezing water is exothermic
burning methane is exothermic

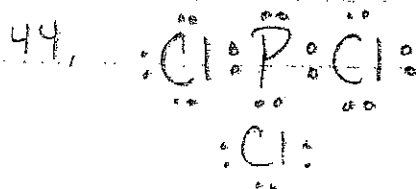


CP Final Review Multiple Choice Answers

1	3	23	4
2	1	24	2
3	3	25	1
4	1	26	3
5	4	27	3
6	3	28	2
7	1	29	3
8	3	30	3
9	2	31	3
10	1	32	2
11	3	33	1
12	1	34	2
13	4	35	3
14	1	36	3
15	4	37	2
16	3	38	2
17	3	39	2
18	4	40	2
19	1	41	1
20	4	42	3
21	4	43	PV = nRT
22	1		

$$(4.00 \text{ atm})(2.00 \text{ L}) = n \left(\frac{0.0821 \text{ L}\cdot\text{atm}}{\text{K}\cdot\text{mol}} \right) (303 \text{ K})$$

$$n = 0.322 \text{ mol}$$



Polar Molecule
because it
is asymmetric