Answers – Exam 1

Multiple Choice

1. D  B, C (1 pt)
2. A  
3. C  D (1 pt)
4. C  
5. D  B, C (1 pt)
6. B  
7. B  D (1 pt)
8. A  C (1 pt)
9. A  D (1 pt)
10. A  C (1 pt)
11. C  D (1 pt)
12. D  
13. D  C (1 pt)
14. C  D (1 pt)
15. A  D (1 pt)
16. A  B (1 pt)
17. C  A, D (1 pt)
18. C  
19. D  B, C (1 pt)
20. A  
22. A  B (1 pt)
23. D  B (1 pt)
24. B  D (1 pt)

keyed wrong originally; A still got 2.5 and C originally got 1 (then increased to 2.5); anyone who answered A kept the 2.5 points

Problems

1. A. 1.875 M; 22.00%; 1.663 m; 8.807% Na₂SO₄; water  
   B. 9.6×10⁻⁵ M

2. 75.0 g; 25.0%; 75.0%; 0.320 mol; 0.814 mol; 0.282; 0.718; 208 mmHg; 212 mmHg; 420 mmHg

3. A. 1.97 m; 4.76°C; −4.76°C; 1.33°C; 101.33°C  
   B. ΔT_b and ΔT_f would be lower; T_b would be lower; T_f would be higher

4. A. rate = k[A][B]^(1/2)  
   B. 9.46 M⁻¹·min⁻¹ or 9.46 L¹·mol⁻¹·min⁻¹  
   C. 1  
   D. 0.5  
   E. 1.5

Extra Credit

1. Conduct a freezing point depression experiment (not the only method – could use any colligative property) with solvent with known $K_f$ and known concentration.
2. $X_{toluene} = 0.430$; $X_{benzene} = 0.570$
3. Many answers – one of the simplest is $A \rightarrow 2B$ and corresponding stoichiometry graph (showing $A_o$ of some amount and $B_0 = 0$ and B produced at twice the rate as A is consumed)